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November 2013

Lions go digital: The Internet's transformative potential in Africa

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Preface

Our 2010 report *Lions on the move: The progress and potential of African economies* focused new attention on Africa's accelerating economic growth, including its dynamic business sector and its expanding consumer market. Since then, the continent's progress has continued, and its growth rates are now among the highest in the world. Today we examine a new chapter in the continent's development, as Africa begins to go digital.

This journey is just beginning. Only 16 percent of the population is online, and the Internet's contribution to GDP is half that in other emerging regions. But the lions are now stirring. A majority of urban Africans own Internet-capable devices, go online regularly, and visit social networking sites. Many countries have rolled out 3G networks, and planned infrastructure investments are likely to increase bandwidth, reduce costs, and connect new corners of the continent. If governments and the private sector continue to build the right foundations, the Internet could transform sectors as diverse as agriculture, retail, and health care—and contribute as much as $300 billion a year to Africa's GDP by 2025.

This work was directed by MGI leaders James Manyika and Michael Chui, and McKinsey High Tech, Media & Telecoms Practice leaders Armando Cabral, Lohini Moodley, Suraj Moraje, and Safroadu Yeboah-Amankwah. Jerry Anthonyrajah, Cristina Gabriel, Fiyin Oladiran, and Roelof van Schalkwyk led the project team, which comprised Borja Camblor, Jaime Aguirre de Carcer, Khethinkosi Dlamini, Ruth Ishimwe, Kitso Lemo, Mind Mabhunu, Rendani Mauda, Juan Sanchez Morales, Valter Roldao, and Joao Silveira. Thanks go to Marisa Carder, Colin Douglas, Deadra Henderson, Marlynie Moodley, Julie Philpot, Gabriela Ramirez, Lisa Renaud, and Rebeca Robboy for their support and contributions. This report would not have been possible without the prior research and thoughtful contributions of numerous McKinsey colleagues around the world. They include Ricardo Chaves, Chinezi Chijioke, Acha Leke, Jennifer May, Bill Russo, Ronald Whelan, and Yassir Zouaoui.

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This report contributes to MGI's mission to help business and policy leaders understand the forces transforming the global economy and prepare for the next wave of growth. As with all MGI research, we would like to emphasise that this work is independent and has not been commissioned or sponsored in any way by any business, government, or other institution.

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The Internet in Africa today …

16%
Internet penetration

167 million
Internet users

67 million
smartphones

>50%
of urban residents are online

51.6 million
Facebook users

$18 billion
Internet contribution to GDP

… and its potential by 2025

~50%
Internet penetration

600 million
Internet users

360 million
smartphones

$75 billion
in annual e-commerce sales

$300 billion
Internet contribution to GDP

~$300 billion
productivity gains in key sectors

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Executive summary

Lions on the move: The progress and potential of African economies, our 2010 report on Africa's rising economies, described a continent in transition, with urbanisation and the rise of the middle-class consumer fuelling growth. Today, following a decade of economic expansion, Africa is going digital. Only 16 percent of the continent's one billion people are online, but that share is rising rapidly as mobile networks are built out and the cost of Internet-capable devices continues to fall.[1] More than 720 million Africans have mobile phones, some 167 million already use the Internet, and 52 million are on Facebook.[2]

Evidence of what is to come can already be seen in Africa's major cities, where consumers have disposable income, more than half have Internet-capable devices, and 3G networks are up and running. There is a growing wave of innovation as entrepreneurs and large corporations alike launch Web-based ventures, from e-commerce sites and digital entertainment platforms to mobile health technologies and online educational content. Governments have placed Internet-driven growth firmly on the agenda: Rwanda, Morocco, and Nigeria, for example, have ambitious plans to expand high-speed Internet access to most of their populations. Most countries have developed national information and communication technologies (ICT) strategies, but many are still in the early stages of implementation.

Today, the Internet's contribution to Africa's GDP remains low, at 1.1 percent—just over half the levels seen in other emerging markets and well below the average of 3.7 percent in developed economies. This figure varies widely across individual countries, from 0.6 percent in Ethiopia to 3.3 percent in Senegal.

But the Internet is likely to take hold on a much larger scale in the coming decade, and previous research has found that its impact is magnified in emerging countries.[3] Mobile telephony has already had an outsized effect in Africa as it connected people who previously had little or no access to telecommunications due to the scarcity of fixed-line infrastructure. If the Internet matches or exceeds that level of impact, the result could be a leap forward in Africa's economic growth and development. Assuming a similar multiplier effect, the Internet could contribute some $300 billion to Africa's GDP by 2025 (see Box 1, "Why the Internet matters").

1 *Measuring the information society 2013,* International Telecommunications Union.

2 International Telecommunications Union statistical database, 2012; Internet World Stats for 2012.

3 *Online and upcoming: The Internet's impact in aspiring countries,* McKinsey & Company High Tech Practice, January 2012.

Box 1. Why the Internet matters

The Internet is a catalyst for economic growth. Previous MGI research found that it has contributed more than 10 percent of total GDP growth over the past five years in China, India, and Brazil, and its impact is accelerating. An increase in a country's Internet maturity correlates with a sizable increase in real per capita GDP.[1]

As countries go online, they realise efficiencies in the delivery of public services and the operations of large and small businesses alike. The benefits of Internet-driven productivity gains are not limited to Web-based companies: among small and medium-sized enterprises (SMEs), 75 percent of the economic impact of the Internet has accrued to companies that are not pure Internet players. In a global survey of 4,800 SMEs, McKinsey found that across all sectors, companies utilising Web technologies grew more than twice as fast as those with a minimal online presence, generating more revenue through exports and creating more jobs.

The Internet also creates tremendous value for consumers. Online prices are, on average, around 10 percent lower than offline prices as a result of the transparency provided by search tools, generating tens of billions of dollars of consumer surplus in the nations with the widest Internet use.

Above all, the Internet will enable Africans to keep in contact with friends, relatives, and customers; access public information and services; manage their health; and advance their education. As Africa grows more connected, millions will tap into information and opportunities that were once beyond their reach. They will gain a greater voice in their communities and enrich the world's flow of commerce and ideas.

1 *The great transformer: The impact of the Internet on economic growth and prosperity*, McKinsey Global Institute, October 2011.

The Internet will generate economic growth and social transformation in six sectors in particular: financial services, education, health, retail, agriculture, and government. In financial services, for example, M-Pesa's mobile money solutions have brought millions of Kenyans onto the financial grid for the first time. Remote diagnostics are expanding medical services to rural areas that have few health-care professionals. Students are beginning to learn with new digital education tools, and e-government initiatives are connecting citizens with services.

This report examines the progress and potential of the Internet in 14 economies that together make up 90 percent of Africa's GDP. In addition to measuring the size of their current Internet economies, it evaluates the strength of five fundamental pillars of Internet readiness: national ICT strategy, infrastructure, business environment, access to financial capital, and the development of ICT-related human capital. By combining these factors, it is possible to map each country's progress on its digital journey. (Kenya and Senegal, for instance, are not Africa's largest economies, but they have nevertheless emerged as the continent's leaders in terms of the relative economic contribution of the Internet.) This benchmarking provides a framework for understanding the paths that can be taken by the public and private sectors to build a robust Internet economy and capture the Internet's full potential.

TAKING STOCK OF THE INTERNET IN AFRICA TODAY

Indicators for Internet penetration and usage reveal significant variations across our sample countries (Exhibit E1). And while Internet penetration is just over 16 percent across the continent as a whole, it is much higher in urban areas,

where more than 50 percent of residents use the Internet regularly (Exhibit E2). A recent McKinsey report found that 25 percent of urban Africans go online daily, led by Kenyans at 47 percent and Senegalese at 34 percent.[4]

Exhibit E1

Penetration and usage vary widely across the continent

Internet penetration and usage, 2012

	Mobile penetration[1] % of population	Internet penetration % of population	Urban internet penetration % of population	Facebook users Million	Online retail penetration %	High-speed Internet penetration[2] % of population	Internet use within companies Index, 0–7	Government departments online %	Government information systems online %
Algeria	103	14	52	4.1	0.39	2.5	3.1	10	1
Angola	49	15	49	0.6	0.49	0.1	3.4	34	7
Cameroon	64	5	–	0.6	0.01	0	4.6	15	16
Côte d'Ivoire	96	4	–	–	–	0	3.9	32	17
Egypt	115	36	46	12.2	0.37	1.8	4.6	53	29
Ethiopia	24	1	47	0.9	0.40	0.8	3.6	20	4
Ghana	100	14	55	1.6	0.43	0.2	4.5	15	9
Kenya	72	28	78	2.0	0.73	0	5.0	24	23
Morocco	120	51	52	5.1	0.50	1.6	4.5	24	13
Mozambique	33	4	–	0.4	–	0.1	4.5	17	11
Nigeria	68	28	50	6.6	0.04	0.1	4.5	10	1
Senegal	88	18	70	0.7	0.44	0.6	5.3	18	3
South Africa	135	17	54	6.3	0.49	1.5	5.3	31	19
Tanzania	57	12	–	0.7	–	0	3.8	17	4

1 Not adjusted for multi-SIMming, i.e., individuals may own more than one SIM card and be counted multiple times.
2 Fixed line only.
SOURCE: Internet World Stats; International Telecommunications Union statistical database, 2012; World Economic Forum Global information technology report 2012; Euromonitor; World Economic Forum Global competitiveness report; McKinsey Global Institute analysis

Exhibit E2

Africa's major cities are embracing the Internet

Among urban residents …

51%
have accessed the Internet in the last month

25%
are online daily

21%
spend more than 10 hours per week online

54%
own Internet-capable devices

57%
of Internet users use social networking sites often

SOURCE: McKinsey Africa Consumer Insights Center survey, 2012; McKinsey Global Institute analysis

4 *The rise of the African consumer*, McKinsey & Company, October 2012.

Significant investments have been made in recent years to build out backbone infrastructure and roll out 3G networks, allowing millions of Africans to connect for the first time. The continent is also in a better position in terms of international bandwidth, as capacity has been added faster than peak demand has grown. But download speeds are slow, there are very few secure Internet servers in most countries, and the cost of bandwidth remains high.

Expanding the Internet's reach across a continent characterised by vast distances and many rural villages is a formidable challenge, but in overcoming these constraints, Africa could eventually join the forefront of the next wave of mobile data innovation. Providing Internet access will also become easier to deliver as Africa's urbanisation rate rises from 40 percent today to 50 percent by 2030.

In terms of economic impact, however, the Internet has yet to produce the same level of contributions in Africa as seen in a sample of major emerging and developed economies. Our analysis shows that the Internet accounts for just 1.1 percent of GDP across our sample of 14 African economies in 2012—just over half its share in other major emerging countries and less than a third of the average in major developed countries.[5]

McKinsey has developed the concept of iGDP as a way to measure the Internet's contribution to the overall economy as a share of total GDP.[6] It totals all the activities linked to the creation and use of Internet networks and services in four major categories: private consumption, public expenditure, private investment, and trade balance. This iGDP approach allows us to make comparisons across countries using national accounts data and the directly measurable parts of economies. We assessed 14 countries that together account for 90 percent of Africa's GDP and found significant variation among them (Exhibit E3). Senegal's iGDP stands at 3.3 percent and Kenya's at 2.9 percent—levels comparable to those of France and Germany. By contrast, the continent's largest economies, South Africa and Nigeria, have iGDPs of 1.4 percent and 0.8 percent, respectively.[7] This suggests that there are major untapped opportunities to harness the power of the Internet to drive growth and development.

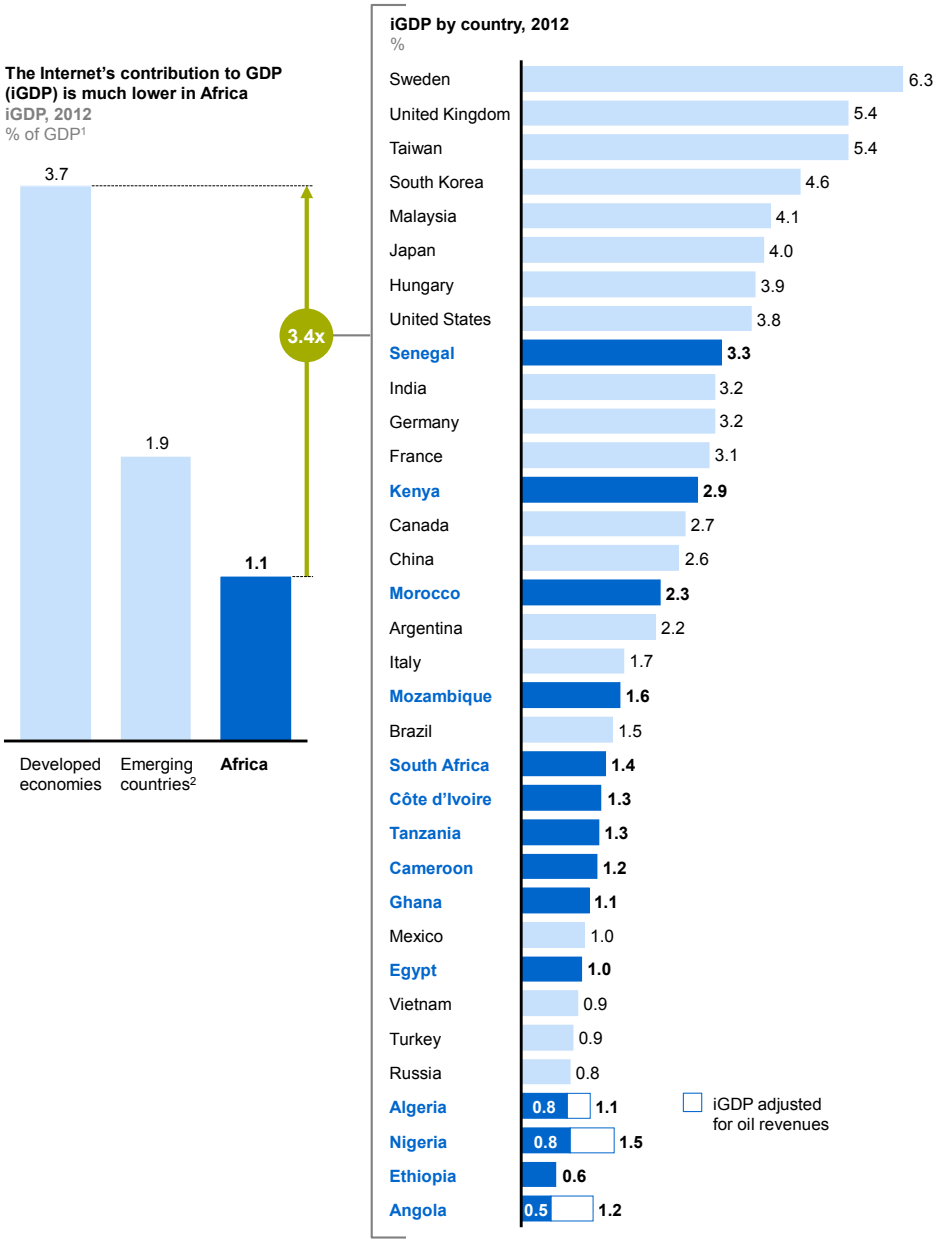
It is important to note, however, that the relative drivers of iGDP are different for each country (Exhibit E4). For example, Kenya's iGDP is dominated by private consumption, while the largest component of Morocco's iGDP is a trade surplus resulting from its business process outsourcing (BPO) industry. There is no single path to success; individual countries will capitalise on their own particular strengths and opportunities.

5 The sample of emerging countries used for this comparison includes Argentina, Brazil, China, India, Malaysia, Mexico, and Turkey. The sample of developed economies includes Canada, France, Germany, Hungary, Japan, Sweden, the United Kingdom, Taiwan, and the United States.

6 See the appendix of this report for further details on the methology. We have previously used this approach to measure the impact of the Internet on advanced economies (see *Internet matters: The Net's sweeping impact on growth, jobs, and prosperity*, May 2011) as well as emerging economies (*Online and upcoming: The Internet's impact in aspiring countries*, January 2012).

7 Note that Nigeria's iGDP rises to 1.53 percent when its GDP figure is adjusted to account for the impact of oil revenue.

Exhibit E3
Senegal and Kenya are leading the way on the continent



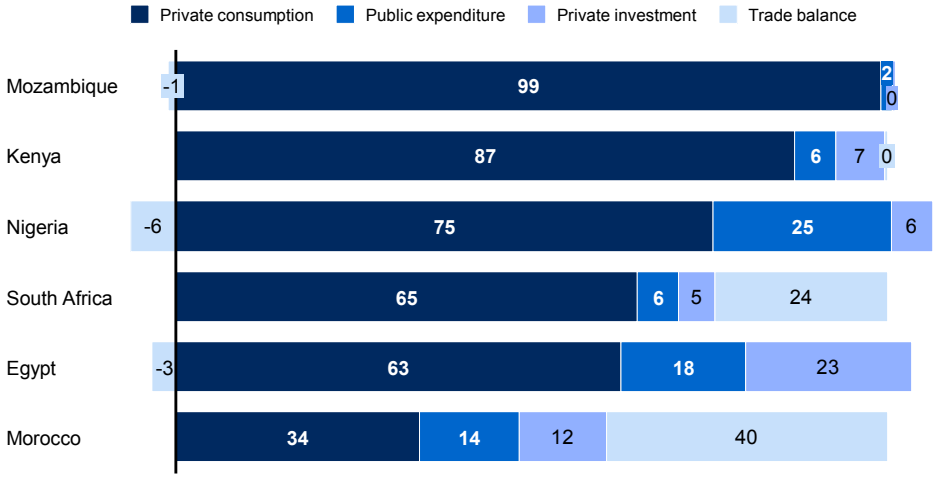
1 GDP assessed by expenditure method, with a share of each category attributed to the Internet.
2 Aspiring countries data is from 2010.

SOURCE: Gartner; IHS Global Insight; Organisation for Economic Co-operation and Development; International Telecommunication Union; International Data Corporation; World Health Organization; ICD; iConsumer US 2012; Euromonitor; H2 Gambling Capital; PhoCusWright; Pyramid Research; UNESCO (United Nations Educational, Scientific and Cultural Organization); McKinsey Global Institute analysis

Exhibit E4

The relative drivers of iGDP vary by country

%



NOTE: Numbers may not sum due to rounding.
SOURCE: McKinsey Global Institute analysis

In dollar terms, the 2012 iGDP for the 14 countries we studied is $17.7 billion, which is 1.1 percent of their total GDP. (Since these countries represent 90 percent of Africa's GDP, they account for the vast majority of its iGDP as well. We estimate iGDP for the entire continent to be in the range of $18 billion to $18.5 billion.[8]) Private consumption of Internet-related services and equipment, including smartphones, accounts for two-thirds of this total. Public expenditure on the Internet, including digitisation of education and health services, contributes only 11 percent to iGDP. Private investment in infrastructure and digitisation accounts for a further 9 percent, while the remainder is a positive trade balance created by BPO services.

THE LEAPFROG OPPORTUNITY AND ITS DRIVERS

To put the Internet's potential for Africa in perspective, it is helpful to consider the impact of the mobile phone, which has revolutionised the way individuals interact and the way SMEs, farmers, and informal traders operate. As a result, mobile revenue is equivalent to 3.7 percent of GDP in Africa, more than triple its share in developed economies, where it was an incremental innovation

The Internet's effects could be similarly magnified in Africa. Despite the fact that Africa's iGDP is currently lower than that of other regions, our analysis suggests that the Internet will take hold on a much larger scale in the coming decade—and as it does, it could provide new solutions to some of Africa's major social challenges.

In a baseline scenario, Africa's iGDP could grow to at least 5 to 6 percent of GDP, matching that of leading economies such as Taiwan, the United Kingdom, and Sweden. However, if the Internet achieves impact on the same scale as mobile telephony in Africa, iGDP could account for as much as 10 percent of total GDP by 2025—or some $300 billion.

8 This estimate assumes the iGDP for the African countries not included in our sample is 0.2 to 1 percent.

In this leapfrog scenario, increased Internet penetration and use could propel private consumption almost 13 times higher than current levels of $12 billion, reaching some $154 billion by 2025. The amount spent on Internet access and use alone could increase from $5.7 billion today to $35 billion in 2025. If 10 percent of retail spending in Africa's largest economies were to move online, e-commerce activity could result in revenue of $75 billion.

Today, public expenditure on the Internet is approximately $2 billion, which translates into just under $3 per capita. If governments implement their national ICT strategies, move a number of services online, and introduce digital health and education initiatives, this could increase to $60 billion, or $50 per capita. This potential jump would exceed Brazil's current spending ($32 per capita) but would remain significantly below levels in developed countries. In order to deliver on their strategies, governments may need to redirect some of their existing spending and generate additional funds for incremental expenditure.

With telecom operators rapidly rolling out coverage and companies across all sectors digitising operations, private Internet investment could potentially reach $62 billion annually by 2025. Africa's private-sector ICT investment could rise from a low base of $2.45 per capita today to some $52 per capita (lower than Argentina and Taiwan today).

Given levels of pent-up demand and the current pace of innovation, Africa's iGDP could catch up very quickly with that of countries in which the Internet has the most impact. There is already a groundswell of activity paving the way towards a future in which digital payments displace cash, consumers shop online, students use personalised learning tools, and doctors connect with patients in rural villages. To sustain this momentum, however, governments and the private sector will need to ensure that the foundations are in place to support demand and continue this wave of innovation. Increasing access, developing a workforce with ICT skills, and improving digital literacy in the broader population will be critical for the future growth of the Internet.

Burgeoning demand and booming private consumption

Africa is the world's most youthful continent, with more than 200 million people between the ages of 15 and 25—the cohort that uses technology the most. This demographic shift will create millions of new Internet users in the coming decade. And as Africa continues to urbanise, incomes are rising. Some 128 million households are projected to have significant discretionary income by 2020.[9]

More than half of urban African consumers already have Internet-capable devices. Basic smartphones have already fallen below the "tipping point" of $100 per unit, and as a result, Africa's smartphone penetration could rise from 2 to 5 percent today to 50 percent in leading countries and 30 percent overall. This translates into 300 million new smartphones being sold in Africa in the decade ahead. PC, laptop, and tablet penetration could double to 40 percent, again equating to nearly 300 million additional devices sold. Continued growth will be driven by falling costs and the introduction of durable, affordable products such as Veda laptops, Netsurfer tablets, and Mi-Fone and VMK mobile phones.

9 See *Lions on the move: The progress and potential of African economies*, McKinsey Global Institute, June 2010. The report estimates that incomes for 128 million households will exceed $5,000 (measured in purchasing power parity). This is the level of which households start spending roughly half their income on items other than food.

Bold initiatives and big investments by government and business

Demand is also being driven by government ICT strategies. Many countries are moving processes such as benefit payments, tax filing, and passport applications online, and efforts are gearing up to digitise education, health, and public services.

Ambitious ICT infrastructure is being planned across the continent, such as Maroc Telecom's $1.2 billion investment to upgrade its network and install fibre optics across Morocco. Undersea cable systems are being expanded, and high-speed 4G networks are being planned. Unitel, for example, is investing $1.35 billion through 2015 to modernise its network in Angola, and Smile Telecoms is rolling out 4G coverage in multiple countries. Morocco, Nigeria, and Rwanda are implementing plans to provide most of their populations with high-speed Internet access.

Large businesses and institutions are beginning to exploit the Internet to reduce costs and increase sales. The airline industry is embracing online check-in and e-ticketing, for instance, while banks are promoting online services and developing mobile microfinance products.

Growing trade

Business process outsourcing, software development, and local hardware manufacturing could all contribute to increasing Africa's trade balance (which is currently positive and could grow to $13 billion). In South Africa, BPO already generates more than $1.5 billion in revenue and accounts for 54,000 direct jobs, while Morocco's BPO sector is at similar scale. Ghana, Kenya, Nigeria, and Senegal are among the countries with plans and potential to build their own BPO sectors. Some low-cost devices are already being manufactured on the continent, particularly in Nigeria and South Africa, and there are a number of software development hubs.

A wave of innovation and entrepreneurship

As the Internet expands across Africa, it has become a launching pad for a new generation of digital entrepreneurs. In Nigeria alone, Konga and Jumia have become major online retailers, Paga is emerging as a key player in mobile payments, and Jobberman has created a digital marketplace for employers and job seekers. In Mozambique, a startup called moWoza has created a more efficient supply chain by using text messaging and a smartphone app to deploy available taxi drivers to deliver parcels from wholesalers to informal traders. Elsewhere, Mi-Fone has sold more than a million low-cost mobile phones across the continent, and ReKindle Learning, a South African startup, is developing personalised, interactive learning tools that work on simple mobile devices. For the first time, there could be effective content aggregation on the continent, driven by the likes of iROKOtv, a digital delivery platform for locally produced content.

Success stories like these are attracting global investors and spurring the formation of local angel investor and venture capital networks. Incubators are also springing up across the continent, from Kenya's iHub to South Africa's JoziHub to Cameroon's ActivSpaces. Nigeria has produced two notable examples: the Co-Creation Hub (or CcHub) and the Wennovation Hub. Microsoft recently

announced a partnership with three leading African incubators to support startups. Many of Africa's startups are not just focused on local opportunities but are "micro-multinationals" (that is, small businesses utilising technology and the Internet to access customers and suppliers globally).

CAPTURING GROWTH AND PRODUCTIVITY GAINS IN SIX SECTORS

The largest economic and social impact of the Internet is likely to be concentrated in six sectors: financial services, education, health, retail, agriculture, and government. These sectors face specific service delivery challenges, information asymmetries, or market gaps that can be bridged through the use of Internet technologies. They also stand out because of the size of the population that could benefit from these innovations. Technology-related productivity gains in these sectors could reach $148 billion to $318 billion by 2025. As costs are reduced, companies and organisations can extend products and services to populations that were excluded in the past. A number of exciting innovations are already unfolding in each of these sectors.

Financial services

Despite the inroads made in mobile payments and money solutions in recent years (most notably by Kenya's M-Pesa), more than three-quarters of adults in sub-Saharan Africa still lack accounts at formal financial institutions. But the Internet is likely to be a huge accelerator of financial inclusion as it reduces transaction costs and brings financial services to people who may live far from the nearest bank branch or ATM.

With the right technology solutions in place, more than 60 percent of Africans could have access to banking services by 2025, and more than 90 percent could use mobile wallets for daily transactions and remittances. Revenue from mobile financial services could increase from less than $1 billion today to $19 billion in 2025. In addition to increased revenue, productivity gains in the sector are estimated to be $8 billion to $10 billion.

To realise this growth, mobile money operators will need to scale up mobile payments in countries where they have not been widely adopted and ensure interoperability across each country and across borders. Companies can also begin to deliver a fuller range of banking options—including micro-savings, micro-credit, and micro-insurance products—online and on phones.

Education

The goal of delivering a high-quality education to every child in Africa remains unfulfilled. But new digital tools have the potential to deliver rapid gains in access to education, teacher training, and learning outcomes. Students who once had few textbooks can log on and learn with the world's best educational content on affordable tablets or e-books, while teachers will have access to better training. Education spending accounts for a sizeable portion of most government budgets, and now Web-based school management systems and online testing can support standardisation and monitoring of school performance that will make this public expenditure more effective.

These innovations can reach classrooms across the continent if governments, non-profits, and the private sector work together to obtain parent and teacher buy-in, deliver affordable smart devices, build ICT skills among teachers, and overcome infrastructure limitations (including connectivity and power). The technology-related productivity gains in education could reach $30 billion to almost $70 billion—enabling governments to achieve more with their education budgets and providing millions of students with the foundation for a better future.

Health

Today, Africa has only 1.1 doctors and 2.7 nurses per 1,000 people, and many people travel long distances for treatment and care. The Internet could also improve the efficiency of health spending—reducing the cost of treating chronic disease by 10 to 20 percent, reducing drug counterfeiting by 80 percent or more, and saving nurses' time. In fact, technology-related benefits for health care are estimated to be $84 billion to $188 billion. The investment in these systems will itself represent a significant contribution to iGDP—but the broader social and economic impact of improved health outcomes will be far greater.

Remote diagnostics and telemedicine could address 80 percent of the health issues of patients in rural clinics, which are typically the most poorly staffed, thereby revolutionising health care for large portions of the population while reducing costs and travel time. The Internet will enable widespread automation and centralisation of patient admissions, health records, and supply chains in public health systems and private hospitals. It also paves the way to advances in practitioner education and training.

Retail

Today, the formal retail sector is relatively underdeveloped across most of the continent, outside of South Africa. But e-commerce will open up a new shopping experience for Africa's growing middle class, giving consumers access to more choice, better quality and convenience, and lower prices, while possibly unlocking incremental demand.[10] By 2025, e-commerce could account for 10 percent of retail sales in Africa's largest economies, which would translate into some $75 billion in annual online sales. At the same time, the Internet will enable substantial productivity and efficiency gains, including cost savings, strengthened supply chains, and digitised payment collection. Technology-related productivity gains in this sector are estimated to be $16 billion to $23 billion.

E-commerce allows entrepreneurs and SMEs to connect with a large customer base and scale up rapidly. Examples on the continent include Zando, Jumia, and Konga. E-commerce also creates opportunities for "last-mile" logistics companies, as well as other support services such as payments. Paga, a Nigerian startup, offers a variety of mobile payment solutions, from SMS and a mobile app to online payments.

10 *China's e-tail revolution: Online shopping as a catalyst for growth,* McKinsey Global Institute, March 2013.

Agriculture

Growth from agriculture is at least twice as effective in reducing poverty as growth in other sectors.[11] Huge efforts are under way across the continent to grow agriculture's output, value, and social impact—and the Internet has the potential to accelerate those efforts. It can connect farmers with expertise and information on everything from weather, crop selection, and pest control to management and finance. It can also improve their access to markets and increase their pricing power. As they go online, agricultural exchanges are growing in breadth and sophistication; the East Africa Exchange, for example, provides a virtual trading platform as well as support services and market intelligence. Nigeria has used mobile technology to revamp its system for delivering fertiliser subsidies. Its "e-wallet" programme has already achieved major savings, eliminated opportunities for corruption, expanded the number of farmers served, and far exceeded its production targets. Internet technology can drive up to $3 billion in annual productivity gains in the sector.

Government

The Internet is a powerful tool to improve transparency, provide citizens with access to information, and automate revenue collection. By 2025, half or more of all government departments in Africa could have automated information systems—and all customer-facing government departments could have an online presence, allowing citizens to access services at the touch of a button. Potential technology-related productivity gains in government are estimated to be $10 billion to $25 billion, enabling more effective service delivery.

ASSESSING EACH COUNTRY'S PATH

To develop a strong Internet ecosystem, public and private attention must be focused on both supply and demand. Infrastructure is critical and usually receives the bulk of public and private investment, but there are other important components of a healthy and vibrant system. For a country to unlock the Internet's full economic potential, five pillars must be in place: national ICT strategy; infrastructure; a healthy business environment; financial capital; and human capital with the requisite technology skills. McKinsey has developed the Internet Foundations Index (i5F) to measure the strength of these pillars. This score is an indicator of Internet "readiness" that correlates closely with economic impact in the form of iGDP.

We analysed a sample of 14 countries that together account for 90 percent of Africa's GDP.[12] The average i5F score for the sample is 37 percent, which compares to 50 percent for leading emerging economies and 66 percent for developed economies.[13]

11 *Agriculture sector strategy 2010–2014,* African Development Bank Group, January 2010; *World development report 2008: Agriculture for development*, World Bank.

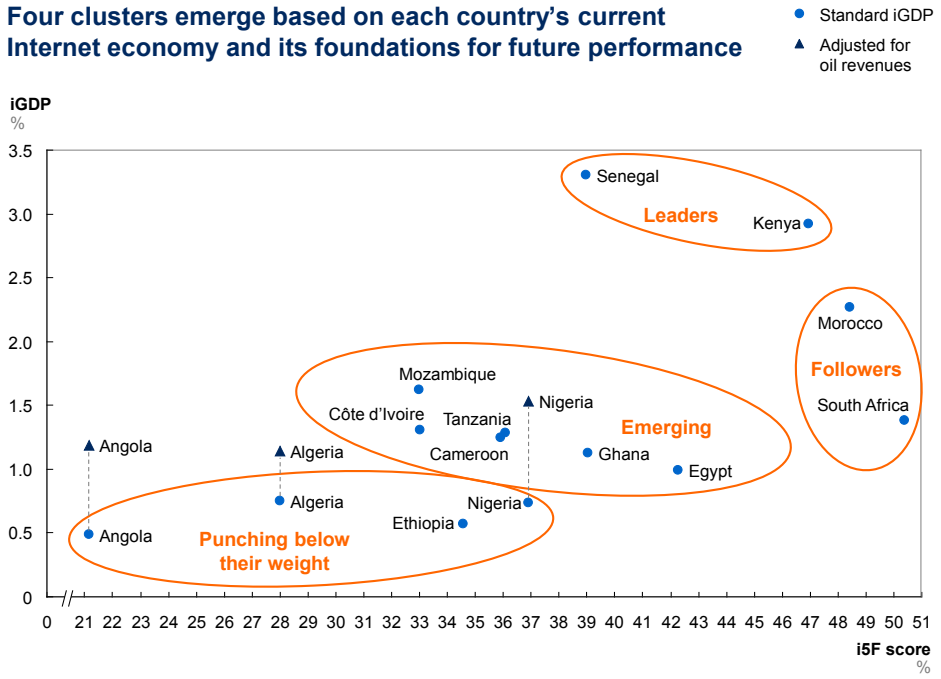
12 Countries included in the sample have populations exceeding 12 million, GDP exceeding $12 billion, and GDP per capita exceeding $500.

13 The emerging economies in this sample are Argentina, Brazil, China, India, Malaysia, Mexico, and Turkey. The developed economies are Canada, France, Germany, Hungary, Italy, Japan, Sweden, the United Kingdom, and the United States.

Mapping each country's iGDP against its i5F score yields four clusters of countries, indicating their relative levels of Internet development (Exhibit E5). It reveals that some countries are much further along the path of Internet-driven growth than others. The specific steps needed to unlock the Internet's economic development potential vary considerably depending on these starting points.

Exhibit E5

Four clusters emerge based on each country's current Internet economy and its foundations for future performance



SOURCE: McKinsey Global Institute analysis

Leaders: Kenya and Senegal

Among our sample of 14 African countries, the two nations with the largest iGDP (or share of the Internet's contribution to GDP) are Senegal and Kenya. This is perhaps a counterintuitive finding, as they are not the continent's largest economies. But both governments have made it a priority to stimulate Internet demand and have therefore driven private consumption, which accounts for more than 85 percent of iGDP in each country.

It is worth noting that Kenya and Senegal do not lead the sample in overall i5F scores, but their high scores on the dimension of national ICT strategy alone could have been the impetus for their iGDP today. Senegal's government, for instance, was one of the first on the continent to invest in fibre-optic infrastructure and prioritise the rollout of Internet cafés. Its e-government project has directed resources to digitising education, public administration, and health-care services.

Even though Senegal has a higher iGDP today, Kenya may be better positioned for the future, given its trade surplus (0.3 as a percentage of GDP) and its track record of working closely with the private sector to drive investment. Kenya's ICT board is focused on implementing a long-term national vision, facilitating investment, and encouraging innovation in both the private and public sectors.

To maintain their current lead, however, both countries will need to improve their infrastructure and cultivate a workforce with ICT skills. Senegal could also benefit from focusing on access to capital. These priorities could make iGDP in both countries less dependent on private consumption and more in line with the iGDP of developed countries.

Followers: Morocco and South Africa

Morocco and South Africa lag behind Kenya and Senegal in terms of iGDP, with lower contributions from private consumption. But Morocco and South Africa are the leaders in trade surplus, thanks to strong business process outsourcing industries, and have a higher contribution from public expenditure and private investment. Morocco's slightly better performance could be explained by its higher levels of private investment and public expenditure, and thus better infrastructure.

Morocco and South Africa could become future leaders on the continent, as they lead the sample in terms of i5F scores, with particularly strong showings for business environment and financial capital. The presence of these building blocks indicates the potential for future growth. Already Morocco has the highest Internet penetration in Africa (and recently announced a 10-year plan to create universal broadband access), while preliminary 2013 data indicate that South Africa's Internet adoption is rapidly accelerating. To fully leverage these advantages, both countries may need to strengthen infrastructure, cultivate ICT skills in their workforce, and sharpen their national ICT strategies.

Emerging: Cameroon, Côte d'Ivoire, Egypt, Ghana, Mozambique, and Tanzania

Apart from Mozambique (1.6 percent), these countries post iGDPs of 1.3 percent or lower. Private consumption accounts for more than 90 percent of iGDP, except in the cases of Ghana (86 percent) and Egypt (63 percent). Egypt stands out in terms of private investment and public expenditure in per capita terms (although there is room to increase both as a percentage of GDP). Overall, these countries currently have weak foundations for Internet growth, but there is potential for more coordinated national ICT strategies to change this picture by building on the relative strength of their business environments.

Punching below their weight: Algeria, Angola, Ethiopia, and Nigeria

In these countries, the Internet contributes less than 1 percent of GDP. However, the composition of iGDP is very different in Ethiopia, which is a pre-transition economy, than in Angola, Nigeria, and Algeria, which are resource-rich economies. In Ethiopia, private consumption accounts for 98 percent of iGDP, while in the other countries, private investment and public expenditure play bigger roles.

Furthermore, if we adjust the GDP figures for Angola, Algeria, and Nigeria to account for the somewhat distorting factor of oil revenue, their iGDP would increase to 1 to 1.5 percent. These countries also tend to have low i5F scores, however. The question they face is whether they could direct resource revenue to drive public expenditure and private investment to build their ICT sectors and broaden economic development.

UNLOCKING THE INTERNET'S FULL POTENTIAL

The specific actions that countries need to take depend on their current situation, but across the board, there is a need to strengthen the foundations of human capital and infrastructure. There are several specific areas of action for African policy makers and business leaders.

Government initiatives

All 14 countries in our sample have singled out Internet development as a priority, but not all have been systematic in their approaches or successful in translating their goals into GDP impact. In the i5F index, most countries scored above 40 percent for national ICT strategy, but the leaders on this dimension were Senegal (68 percent) and Kenya (59 percent), pointing to the important role that government can play in developing the ICT sector on the continent.

In our view, there are five key elements that determine a government's ability to successfully support the development of the Internet. These include a coordinated national vision, driven by a strong champion who may take on a role similar to that of a chief information officer; collaboration with the private sector; a strategy for generating demand; support for expanding access; and a commitment to building ICT capabilities.

In addition, governments will need to allocate resources and funding to implement their ICT strategies effectively. Potential sources of funding include increased revenue collection as a result of e-filing, productivity gains from digitising government processes, or redirecting existing spending as services migrate (for example, replacing spending on textbooks with spending on e-readers and online content).

Private-sector opportunities

The growth of the Internet in Africa opens the door for established companies to expand their reach and add new business lines. But the competitive dynamics are intensifying. The Internet gives startups the ability to scale up rapidly, and some may be sources of low-cost innovation that can disrupt entire industries.

In addition, multinationals increasingly realise that Africa's growing Internet penetration presents an opportunity to reach untapped markets. If local companies do not innovate quickly, they could lose out to multinationals that import solutions. For foreign companies, the challenge will be tailoring their offerings to the needs of Africa's diverse markets and competing with businesses that understand the local context and how to operate in it. It will be important to spot gaps in the market and move decisively, as first movers are likely to gain a significant advantage.

Large telecom operators will need to prepare for a pronounced migration from voice to data. They can create consumer demand by pushing for low-end smartphones, providing transparent entry-level pricing, improving the network experience, educating customers on the utility of the Internet, and ensuring that setup is hassle-free. In addition, there will be opportunities to leverage the mobile network to deliver ICT services to business customers.

More broadly, telecom operators and technology companies can partner with governments or with other enterprises to drive the digital revolution. Public-private partnerships could make strides in delivering infrastructure, developing ICT capabilities, or delivering e-government, education, and health services. Companies from different sectors may need to collaborate to deliver new products and services: banks and telecom operators have partnered to provide mobile financial services, for instance, while e-commerce depends on cooperation from multiple players to set standards, create payment platforms, and develop logistics.

Entrepreneurs are an important force in the Internet ecosystem, and they have a number of opportunities within the ICT sector and across the broader economy. But while the Internet dramatically reduces the time and cost of launching a new enterprise, the key to success is building a compelling value proposition and a well-crafted market entry strategy. To navigate these challenges and access funding, entrepreneurs can turn to the networks and support structures that are emerging across the continent, including incubator hubs and angel networks, as Africa builds its tech community.

□ □ □

Despite a slow start, Africa's digital development is now accelerating. As the continent grows more connected, it is already producing innovative Web-based applications and dynamic new business models. Today Africa still lags behind other regions, but if it can bring Internet-related investment, adoption, and use up to the levels of other regions, the prize will be huge. For now, the Internet in Africa remains a wide-open space where companies and entrepreneurs can capture large opportunities if they are willing to move rapidly and decisively. And most exciting of all are the possibilities for using the Internet to revamp the delivery of education, health, and other public services—transforming lives in the process.

1. Africa's accelerating digital transformation

Over the past decade, Africa has made notable strides in economic development. Rapid urbanisation, growing consumer spending power, and unprecedented business interest and investment have combined to produce some of the world's highest GDP growth rates.[14]

One feature of this growth story has been the rapid rise of mobile telecoms. Across the continent, mobile subscriptions increased from fewer than 25 million in 2001 to some 720 million by 2012.[15] This has greatly expanded Africans' access to markets and services and has spurred innovation and efficiency in sectors as diverse as agriculture, banking, and health care. African businesses have been global pioneers in areas such as mobile payments and mobile education. As a result, the impact of mobile telephony on GDP has been three times as large in Africa as in the developed world.

Today another great shift is under way. Africa is going digital—and as a result, there is new potential for economic growth and social transformation. Currently, some 16 percent of Africa's one billion people are online. But that share is rising rapidly as mobile networks continue to be built out and the cost of Internet-capable devices continues to fall.

Evidence of what is to come can already be seen in Africa's major cities, where consumers have disposable income and 3G networks are up and running. Already, some 50 percent of Africa's urban residents use the Internet regularly. They are ready and eager to use it more often and more intensively, and they will be joined online by millions of new users.

A wave of innovation is growing in Africa's ICT (information and communication technologies) sector. Large corporations and entrepreneurs alike are launching new ventures to capture the digital opportunity and use technology to address longstanding challenges in education, health, and financial inclusion. Governments have placed Internet-driven growth firmly on the agenda; many countries have already developed national ICT strategies, many of which are still in the early stages of implementation.

Providing greater connectivity across the continent would have a profound impact on GDP, business growth, and social outcomes. In a baseline scenario, the Internet's contribution to GDP in Africa should at least reach that in leading economies such as Taiwan, the United Kingdom, and Sweden (5 to 6 percent). However, if the Internet's impact matches or exceeds that of mobile telephony in Africa, it could account for as much as 10 percent of total GDP by 2025—or

14 *Lions on the move*, McKinsey Global Institute's 2010 report on Africa's economic prospects, shows that the continent will profit from rising global demand for natural resources, boast a consumer market of 128 million households by 2020, and see its labour force top one billion by 2040.

15 *The transformational use of information and communication technologies in Africa,* World Bank and African Development Bank, 2012; International Telecommunications Union statistics, 2012.

some $300 billion. This shift would spur growth in financial services, retail, and agriculture; contribute to dramatic improvements in education and health-care systems; and strengthen transparency and efficiency in public services. Achieving these gains, however, will require unprecedented innovation and investment from policy makers and business leaders alike.

THE GREAT TRANSFORMER: THE INTERNET'S IMPACT ON ECONOMIC GROWTH

Previous MGI research has shown that the Internet exerts strong influence on economic growth. In the developed world, it already contributes more than 20 percent of GDP growth. In China, India, and Brazil, the Internet has contributed more than 10 percent of total GDP growth over the past five years, and its impact is accelerating.[16]

MGI also found that an increase in a country's Internet maturity correlates with a sizeable increase in real per capita GDP—a fact that underlines the potential for Africa to harness the Internet as a tool to make a leap forward in economic and social development. As countries go online, they realise efficiencies and invite innovation in the delivery of public services and the operations of large and small businesses alike.

And the benefits of Internet-driven productivity gains are not limited to Web-based companies: among small and medium-sized enterprises (SMEs), 75 percent of the economic impact of the Internet has accrued to companies that are not pure Internet players. In a global survey of 4,800 SMEs, McKinsey found that across all sectors, companies utilising Web technologies grew more than twice as fast as those with a minimal online presence. These Web-knowledgeable enterprises also brought in more than twice as much revenue through exports, and created more than twice as many jobs, as their offline peers. According to survey respondents, the Internet has created 2.6 new jobs in the SME sector for every job eliminated by increased efficiency.[17]

Worldwide, the Internet has also created value for consumers through the rapid growth of e-commerce and wider access to product and price information. In China alone, the "e-tailing" market has grown at a compound annual rate of 120 percent since 2003 and is now worth more than $190 billion a year.[18] Online prices are, on average, around 10 percent lower than offline prices as a result of the transparency provided by search tools, generating tens of billions of dollars of consumer surplus in the nations with the widest Internet use.

16 *The great transformer: The impact of the Internet on economic growth and prosperity*, McKinsey Global Institute, October 2011.

17 *Internet matters: The Net's sweeping impact on growth, jobs, and prosperity,* McKinsey Global Institute, May 2011.

18 *China's e-tail revolution: Online shopping as a catalyst for growth*, McKinsey Global Institute, March 2013.

Just as important, the Internet gives individuals new power to access public information and services, manage their health, and advance their education. In the United States, for example, 82 percent of Internet users turn to a search engine when looking for public information, as do 80 percent with questions about their health. As Africa grows more connected, millions will begin to tap into information and opportunities that were once beyond their reach. They will gain a greater voice in their communities and enrich the world's flow of commerce and ideas.

TAKING STOCK OF THE INTERNET IN AFRICA TODAY

Currently 16 percent of the continent's one billion people are online.[19] Some 167 million use the Internet, and 52 million are on Facebook.[20] Penetration rates vary widely between countries (Exhibit 1) and between urban and rural areas.

Exhibit 1

Penetration and usage vary widely across the continent

Internet penetration and usage, 2012

	Mobile penetration[1] % of population	Internet penetration % of population	Urban internet penetration % of population	Facebook users Million	Online retail penetration %	High-speed Internet penetration[2] % of population	Internet use within companies Index, 0–7	Government departments online %	Government information systems online %
Algeria	103	14	52	4.1	0.39	2.5	3.1	10	1
Angola	49	15	49	0.6	0.49	0.1	3.4	34	7
Cameroon	64	5	–	0.6	0.01	0	4.6	15	16
Côte d'Ivoire	96	4	–	–	–	0	3.9	32	17
Egypt	115	36	46	12.2	0.37	1.8	4.6	53	29
Ethiopia	24	1	47	0.9	0.40	0.8	3.6	20	4
Ghana	100	14	55	1.6	0.43	0.2	4.5	15	9
Kenya	72	28	78	2.0	0.73	0	5.0	24	23
Morocco	120	51	52	5.1	0.50	1.6	4.5	24	13
Mozambique	33	4	–	0.4	–	0.1	4.5	17	11
Nigeria	68	28	50	6.6	0.04	0.1	4.5	10	1
Senegal	88	18	70	0.7	0.44	0.6	5.3	18	3
South Africa	135	17	54	6.3	0.49	1.5	5.3	31	19
Tanzania	57	12	–	0.7	–	0	3.8	17	4

1 Not adjusted for multi-SIMming, i.e., individuals may own more than one SIM card and be counted multiple times.
2 Fixed line only.

SOURCE: Internet World Stats; International Telecommunications Union statistical database, 2012; World Economic Forum Global information technology report 2012; Euromonitor; World Economic Forum Global competitiveness report; McKinsey Global Institute analysis

While most other regions have undergone a boom in Internet adoption and experienced considerable Internet-related growth over the past decade, Africa is at the start of this journey. We assessed 14 countries that together account for 90 percent of Africa's GDP and found significant variations in the economic contribution of the Internet (Exhibit 2). Our analysis shows that Africa's iGDP, or the contribution of the Internet to overall GDP, stands at 1.1 percent for these

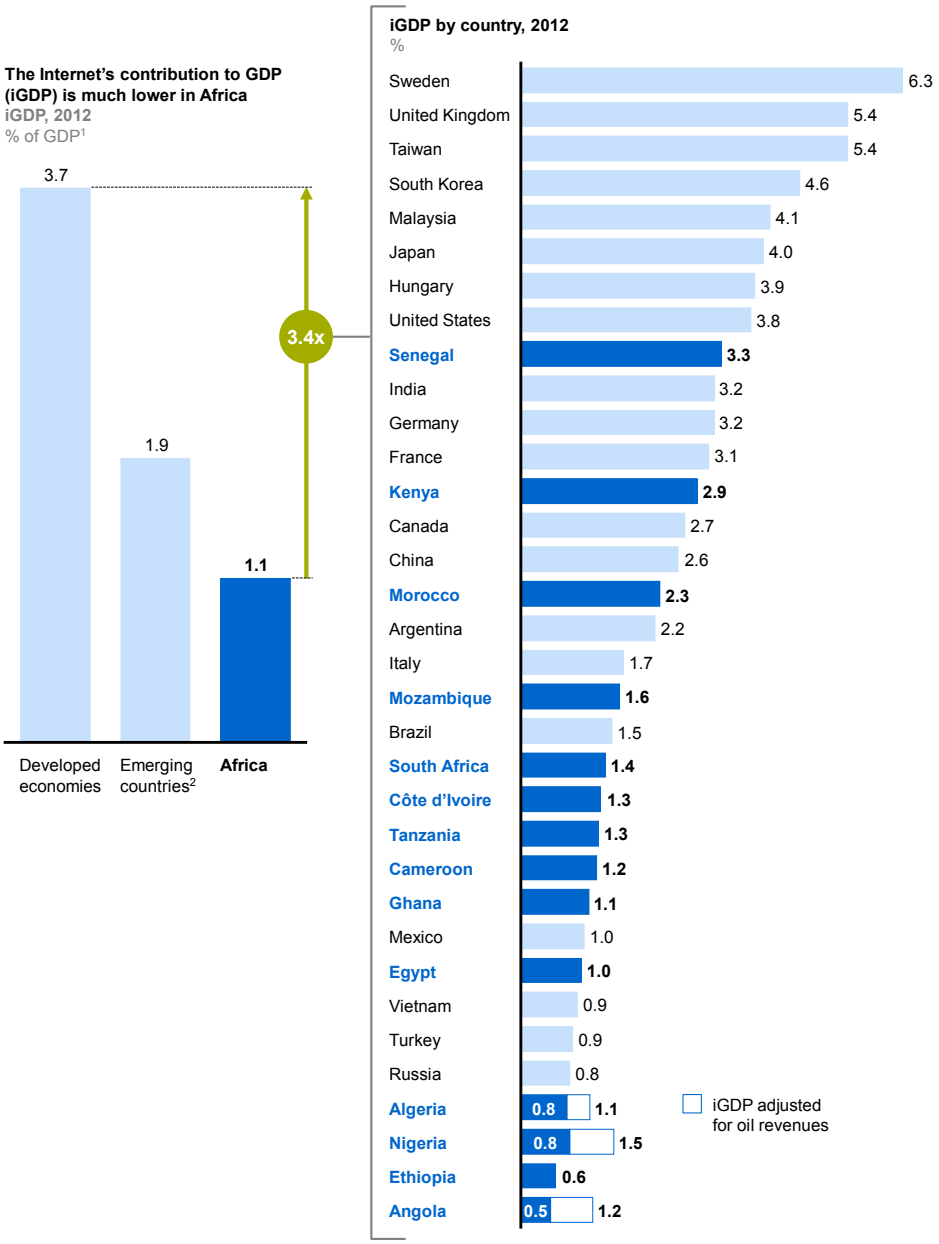
19 *Measuring the information society 2013,* International Telecommunications Union; Internet World Stats for 2012.

20 Internet World Stats 2012.

14 countries—just over half its share in other major emerging countries and less than a third of the average in major developed countries (see Box 2, "McKinsey's iGDP methodology").[21]

Exhibit 2

Senegal and Kenya are leading the way on the continent



1 GDP assessed by expenditure method, with a share of each category attributed to the Internet.
2 Aspiring countries data is from 2010.

SOURCE: Gartner; IHS Global Insight; Organisation for Economic Co-operation and Development; International Telecommunication Union; International Data Corporation; World Health Organization; ICD; iConsumer US 2012; Euromonitor; H2 Gambling Capital; PhoCusWright; Pyramid Research; UNESCO (United Nations Educational, Scientific and Cultural Organization); McKinsey Global Institute analysis

21 The sample of emerging countries used for this comparison includes Argentina, Brazil, China, India, Malaysia, Mexico, and Turkey. The sample of developed economies includes Canada, France, Germany, Hungary, Japan, Sweden, the United Kingdom, Taiwan, and the United States.

Box 2. McKinsey's iGDP methodology

The Internet provides a platform for millions of daily online transactions and communications that make a significant contribution to individual economies. McKinsey developed the concept of "iGDP", first presented at the 2011 e-G8 Forum, as a quantitative approach for assessing this impact. It uses the expenditure method of calculating GDP, assessing all the activities linked to the creation and use of Internet networks as well as Internet services. The four major categories of iGDP include:

- **Private consumption**—the total consumption of goods and services by consumers via the Internet or needed to obtain Internet access, including electronic equipment, e-commerce, broadband turnover of telecoms operators on the retail market, mobile Internet market, hardware and software consumption, and smartphone consumption
- **Public expenditure**—Internet spending for consumption and investment by the government, across software, hardware, services, and telecoms
- **Private investment**—in Internet-related technologies, including telecoms, extranets, intranets, and websites, as well as in infrastructure
- **Trade balance**—including business process outsourcing; international e-commerce; and exports of digital goods and services, as well as Internet equipment, minus all associated imports

McKinsey originally conducted iGDP analysis of the G-8 nations as well as Brazil, China, India, South Korea, and Sweden and found that, on average, the Internet contributes 3.4 percent to GDP in this 13-country sample of emerging and developed countries—and its impact is growing rapidly. Indeed, if measured as a sector, Internet-related consumption and expenditure is now bigger than agriculture or energy in these countries.[1]

1 For a full explanation of the iGDP methodology, see *Internet matters: The Net's sweeping impact on growth, jobs, and prosperity*, McKinsey Global Institute, May 2011, and *Online and upcoming: The Internet's impact on aspiring countries*, McKinsey & Company High Tech Practice, January 2012.

In dollar terms, we estimate that the iGDP of these 14 countries amounted to $17.7 billion in 2012. (Since these countries represent 90 percent of Africa's GDP, they account for the vast majority of its iGDP as well. We estimate iGDP for the entire continent to be in the range of $18 billion to $18.5 billion.[22])

Senegal's iGDP stands at 3.3 percent and Kenya's at 2.9 percent—levels comparable to those of France and Germany. By contrast, the continent's largest economies, South Africa and Nigeria, have iGDPs of 1.4 percent and 0.8 percent, respectively.[23] This suggests that there are major untapped opportunities to harness the power of the Internet to drive growth and development.

22 This estimate assumes the iGDP for the African countries not included in the sample is 0.2 to 1 percent.

23 Nigeria's iGDP rises to 1.53 percent when its GDP figure is adjusted to account for the impact of oil revenue.

Private consumption of Internet-related services and equipment, including smartphones, accounts for more than two-thirds of this total, or $12 billion. Public expenditure on the Internet, including digitisation of education and health services, currently amounts to only $2 billion. Private investment in infrastructure and digitisation drives a further $1.6 billion, while the positive trade balance created by business process outsourcing (BPO) accounts for the remaining $2 billion.

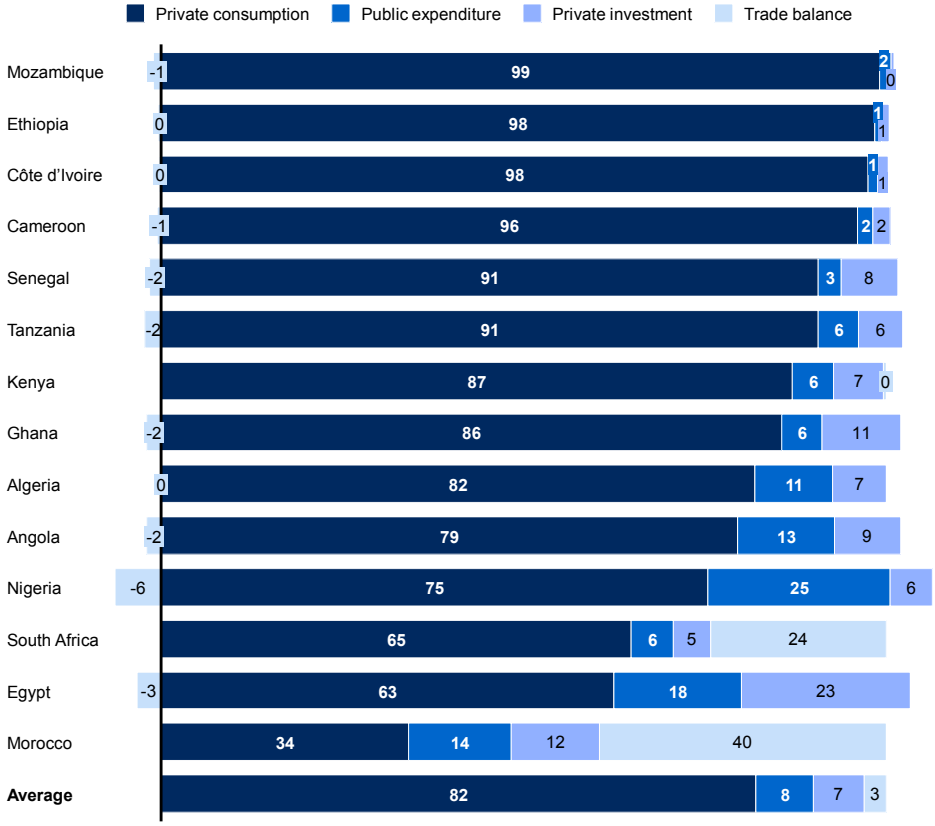
While private consumption is the largest factor in the iGDP of our sample, there is variation across individual countries, illustrating the different paths they have followed (Exhibit 3). Private consumption plays a particularly outsized role in Mozambique, Ethiopia, Côte d'Ivoire, Cameroon, Senegal, and Tanzania, where it accounts for more than 90 percent of iGDP. Kenya, Ghana, Algeria, and Angola show less reliance on private consumption, although its contribution remains high, at about 80–90 percent of iGDP.

Nigeria, South Africa, Egypt, and Morocco have the most diversified iGDP profiles in our sample. As a result of its e-government initiatives, Nigeria stands out for its relatively high proportion of public expenditure, which accounts for 25 percent of iGDP, although private investment lags at 6 percent of iGDP. In Egypt, both private investment (23 percent of iGDP) and public expenditure (18 percent) play an important role. South Africa has a relatively high trade balance (24 percent of iGDP), but lags in terms of private investment (5 percent) and public expenditure (6 percent). In Morocco, the trade balance is the largest element of iGDP (40 percent), thanks to exports from a growing BPO industry.

By contrast, countries that lead in terms of iGDP tend to rely less heavily on private consumption as the major component of iGDP (Exhibit 4). In developing countries such as Taiwan, Malaysia, and Hungary, trade drives 46 to 60 percent of iGDP. In the United Kingdom, South Korea, Japan, and the United States, the Internet-related trade balance is negative, but private investment and public expenditure account for 39 to 57 percent of iGDP. Sweden, the overall leader in terms of iGDP, has strong contributions from all four dimensions.

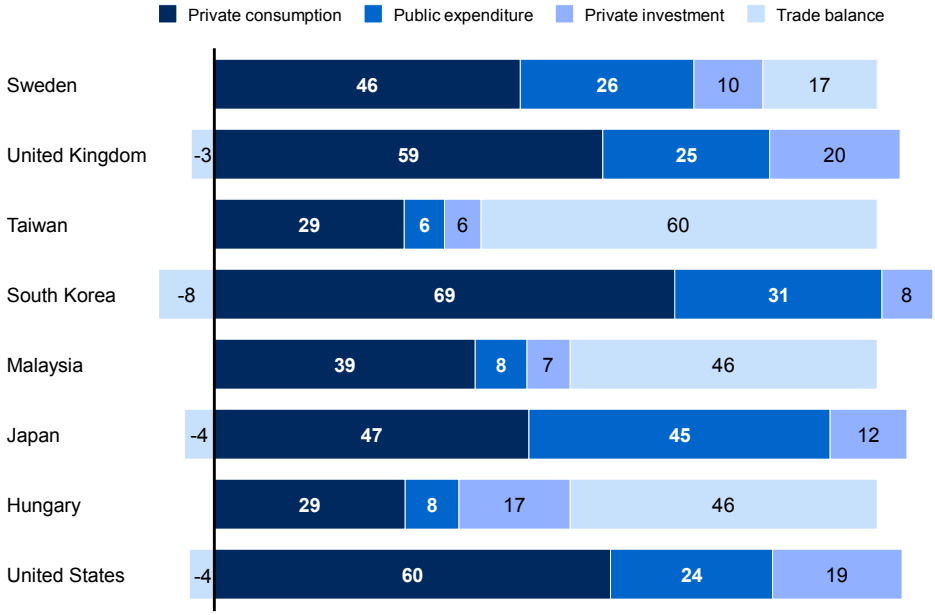
Breaking down the components of iGDP highlights the opportunities for potential growth. In many countries, iGDP growth is likely to come from increased public expenditure and from private investment in network infrastructure and corporate digitisation, as we will discuss later in this report. Developing hardware, software, and BPO industries could provide additional growth, resulting in a neutral or positive trade balance.

Exhibit 3
iGDP composition varies by country


Private consumption
Public expenditure
Private investment
Trade balance
Mozambique -1 99 2 0
Ethiopia 0 98 1 1
Côte d'Ivoire 0 98 1 1
Cameroon -1 96 2 2
Senegal -2 91 3 8
Tanzania -2 91 6 6
Kenya 87 6 7 0
Ghana -2 86 6 11
Algeria 0 82 11 7
Angola -2 79 13 9
Nigeria -6 75 25 6
South Africa 65 6 5 24
Egypt -3 63 18 23
Morocco 34 14 12 40
Average 82 8 7 3

NOTE: Numbers may not sum due to rounding.
SOURCE: McKinsey Global Institute analysis

Exhibit 4
Global iGDP leaders tend to exhibit a lower reliance on private consumption
%


Private consumption
Public expenditure
Private investment
Trade balance
Sweden 46 26 10 17
United Kingdom -3 59 25 20
Taiwan 29 6 6 60
South Korea -8 69 31 8
Malaysia 39 8 7 46
Japan -4 47 45 12
Hungary 29 8 17 46
United States -4 60 24 19

NOTE: Numbers may not sum due to rounding.
SOURCE: McKinsey Global Institute analysis

THE LEAPFROG OPPORTUNITY

To put the Internet's potential for Africa into perspective, it is helpful to consider the example of the mobile phone. Its adoption has had a remarkable impact on Africa's development, connecting people who previously had little or no access to telecommunications due to the scarcity of fixed-line infrastructure. In doing so, it has revolutionised the way SMEs, farmers, and informal traders operate, greatly improving their access to customers, suppliers, and markets. As a result, revenue from mobile telephony in Africa is equivalent to 3.7 percent of GDP, more than triple its share in developed economies, where it was an add-on to fixed-line telephony.

The Internet's effects could be similarly magnified in Africa. Despite the fact that Africa's iGDP remains lower than that of other regions, our analysis suggests that the Internet will take hold on a much larger scale in the coming decade—and its impact could be multiplied well beyond the levels seen in developed countries today.

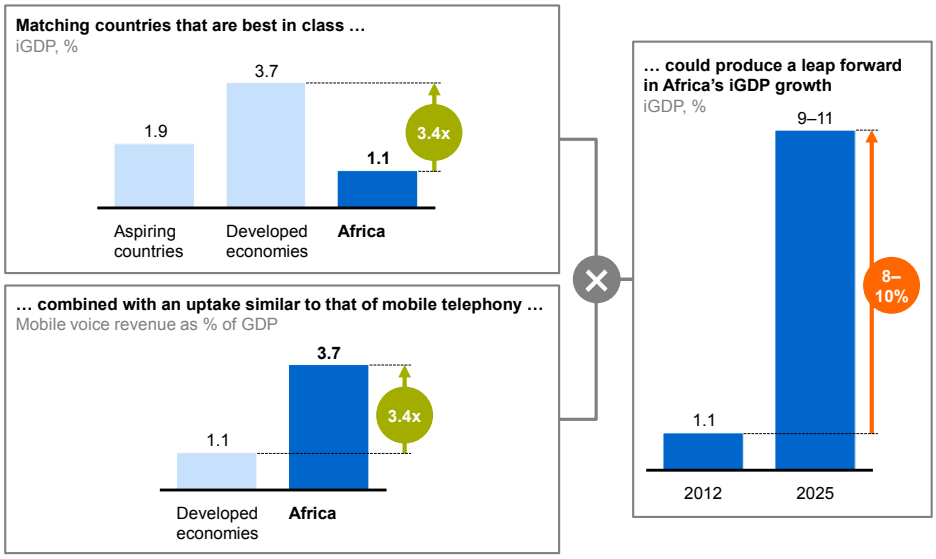
In banking, for example, Africa's branch infrastructure is much smaller than that of developed economies, and the population currently without access to banking services is much larger. The Internet gives Africa's banks the opportunity to leapfrog their peers in the developed world; mobile could become the dominant banking channel, erasing the issue of proximity to physical branches and bringing tens of millions of new customers into the banking system. In retail, online could become an important channel, especially where brick-and-mortar shops have not yet been established. Likewise, given currently low levels of access to quality education and health services across the continent, the spread of technologies such as e-learning and remote diagnostics creates an opportunity for gains in skills, health indicators, and living standards.

In a baseline scenario, Africa's iGDP should grow to at least 5 to 6 percent of GDP, matching that of leading economies such as Taiwan, the United Kingdom, and Sweden. However, if the Internet were to achieve the same scale and impact as mobile telephony in Africa, it could account for as much as 10 percent of total GDP, or some $300 billion, by 2025 (Exhibit 5).

Africa's potential for such a strong increase in iGDP—almost tripling the current average for developed economies—sounds extraordinary. But we believe it is achievable if African governments and businesses continue to invest and innovate. Across the continent, there are opportunities for growth across all four components of iGDP: Internet-related private consumption, public expenditure, private investment, and trade (Exhibit 6).

Exhibit 5

If government and business successfully drive adoption and demand, the Internet could contribute 10 percent to Africa's economy by 2025

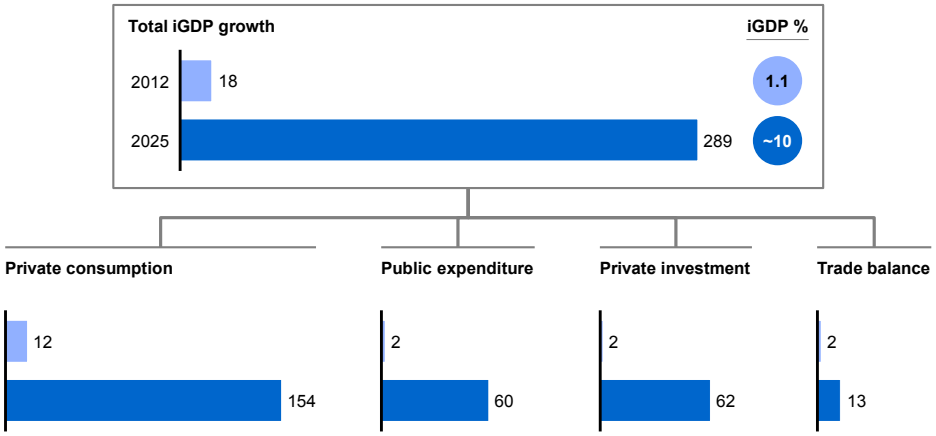


SOURCE: McKinsey Global Institute analysis

Exhibit 6

Each component of iGDP has potential for significant growth

$ billion



NOTE: Numbers may not sum due to rounding.
SOURCE: McKinsey Global Institute analysis

THE DRIVERS OF GROWTH

This section examines some of the major shifts that are taking place in Africa's rapidly evolving Internet economy, paving the way to growth in iGDP. Chapter 2 will further explore opportunities for growth at the sector level, while Chapter 3 will take a more granular look at the progress, potential, and challenges in each of the 14 countries in our sample.

The online population continues to grow, driven by urbanisation, a rising middle class, a large youth population that is embracing technology, and expanded coverage in rural areas. Usage will rise further as consumers begin to rely on online services for everything from shopping and financial services to education and health. In the leapfrog scenario, increased Internet penetration and use could propel private consumption 13 times current levels, reaching some $154 billion by 2025.

Today, public expenditure on the Internet in our sample of 14 countries is approximately $2 billion, which translates into just under $3 per capita. If governments implement their national ICT strategies, move key processes such as benefit payments and tax filing online, and introduce digital health and education initiatives, this could increase to $60 billion, or $50 per capita. This projected jump would exceed Brazil's current spending ($32 per capita) but would remain significantly below levels in developed countries, where public expenditure averages $190 per capita. Potential sources of funding include increased revenue collection as a result of e-filing, productivity gains from digitising government processes, or redirecting existing spending as services migrate (for example, replacing spending on textbooks with spending on e-readers and online content).

With telecom operators rapidly rolling out coverage and companies across all sectors digitising operations, private Internet investment will greatly increase, potentially reaching $62 billion annually by 2025. Infrastructure investment and digitisation by businesses could increase Africa's private-sector ICT investment from a low base of $2.45 per capita today to more than $52 per capita by 2025 (lower than Argentina, Hungary, and Taiwan today). The trade balance, too, is likely to rise as countries such as Ghana, Kenya, Nigeria, and Senegal build BPO sectors and develop more local manufacturing of computers and devices.

Burgeoning demand and private consumption

Africa is the world's most youthful continent, with more than 200 million people aged 15 to 25—the cohort that uses technology the most—and young Africans have had greater access to education than any generation before them. This demographic shift will create millions of new Internet users in the coming decade, as will rapid urbanisation (see Box 3, "Africa's urban Internet").

Imagine the typical university student in 2025. He or she will most likely have a mobile bank account, access course content on a tablet or e-reader, get assistance from online tutors, connect with other students via academic networking sites, shop online for music and entertainment, and stay in touch with friends and relatives via social networking. In other words, many aspects of their lives will be digital.

The sheer number of Internet-capable devices in the hands of consumers is already propelling online activity. Basic smartphones have already fallen below the "tipping point" of $100 per unit, and companies such as Mi-Fone and VMK

now offer affordable devices specifically geared for the African mass market. As a result, Africa's smartphone penetration, currently at 2 to 5 percent, could reach as much as 50 percent in certain countries and 30 percent overall. This translates into 300 million new smartphones being sold in Africa in the decade ahead. PC, laptop, and tablet penetration could double to 40 percent, or nearly 480 million devices. As with phones, this growth will be driven by falling costs and the introduction of durable, affordable products such as Veda laptops and Netsurfer tablets (a South African brand that retails for under $200). In fact, penetration of low-cost tablets could potentially leapfrog the PC in African homes.

Overall Internet penetration could grow to some 50 percent by 2025, similar to the levels of urban Internet penetration today, resulting in some 600 million Internet users in Africa. If this scenario materialises, private consumption of Internet-related goods and services could reach $154 billion in 2025, with $24 billion of that from device revenues and $35 billion from Internet access revenues (Exhibit 7).

Box 3. Africa's urban Internet

In 1980, just 28 percent of Africans lived in cities, but today Africa's level of urbanisation almost matches China's. Forty percent of Africans are urban residents—a share that is projected to reach 50 percent by 2030.[1] This shift is bringing millions within reach of wireless networks, and as more Africans move from farmwork to urban jobs, their incomes are rising. In 2008, roughly 85 million African households earned $5,000 or more, reaching the significant income level at which they start spending roughly half their income on items other than food.[2] The number of households with this level of discretionary income is projected to rise substantially in the coming years, reaching 128 million in 2020. By 2030, the continent's top 18 cities could have a combined spending power of $1.3 trillion, creating a fertile market for e-commerce and other Internet-related services.[3]

Africa's largest cities generate a disproportionate share of its Internet traffic today. A recent McKinsey report found that 25 percent of urban Africans connect daily, led by Kenyans at 47 percent and Senegalese at 34 percent.[4] Across Africa's cities, half of survey respondents had connected to the Internet in the previous month—a share that rose to 78 percent in Kenya. While most Internet users are in higher socioeconomic classes, one-third of working-class urban residents had gone online in the previous month. Where they can, Africans are embracing the Internet with enthusiasm—and they are doing so despite low incomes and limited infrastructure.

More than half of urban African consumers have either smartphones or other types of Internet-capable mobile handsets, although percentages vary from country to country. (In Kenya, for example, 95 percent of those surveyed had such devices, compared to only 25 percent of Angolans.) In many African countries, consumers use mobile phones for Internet activities that users in developed markets would be more likely to do on a laptop or PC. More than one-third of respondents said they had desktop or laptop computers, and 7 percent reported having tablets (although this percentage may rise as more affordable tablets are introduced).

The most popular uses are social networking (including Facebook), email and instant messaging, and accessing music or videos; growing numbers also get their news and search for information online. Online shopping, banking, and travel bookings have been slower to catch on, however. Respondents across all classes expressed strong interest in access to cheaper, faster Internet service.

1 *The state of African cities 2010,* United Nations Human Settlements Programme (UN-Habitat), 2010.

2 Measured in terms of purchasing power parity (PPP).

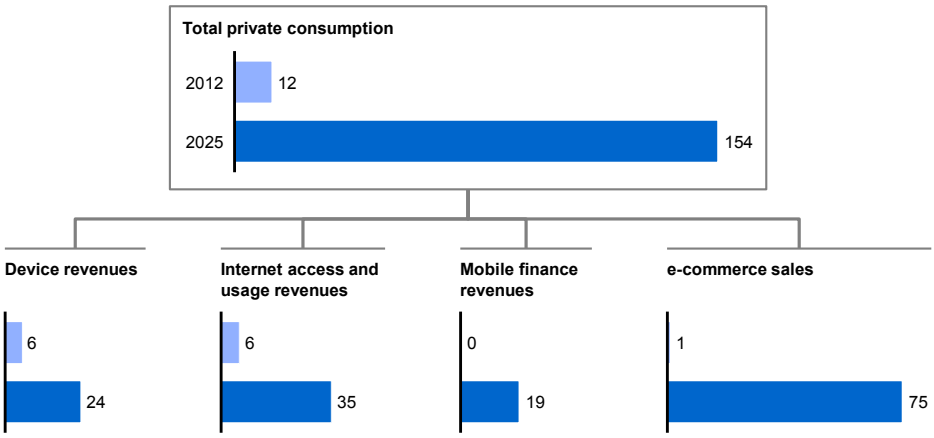
3 *Lions on the move: The progress and potential of African economies,* McKinsey Global Institute, June 2010.

4 *The rise of the African consumer*, McKinsey & Company, October 2012.

Exhibit 7

Private consumption could reach $154 billion by 2025

$ billion



NOTE: Numbers may not sum due to rounding.
SOURCE: McKinsey Global Institute analysis

Increased e-commerce activity could result in revenue of $75 billion if 10 percent of retail spending in Africa's largest economies were to move online. A number of promising e-commerce ventures (such as Nigeria's Jumia and South Africa's Zando) are establishing market share and finding innovative ways to deal with the challenges of logistics and payments on the continent. They are bringing a new retail experience to many parts of Africa where formal retail is relatively underdeveloped.

As mobile handsets replace ATMs and point-of-sale devices, millions will gain greater access to financial services, even in rural areas. Annual revenue from digital financial services could grow from $1 billion today to $19 billion by 2025.

Bold initiatives and investment by government and business

Demand is also being driven by government initiatives, which contribute to growth in iGDP. In addition to investing in infrastructure, governments will increasingly move information services and key processes (such as benefits, tax filing, and passport applications) online.

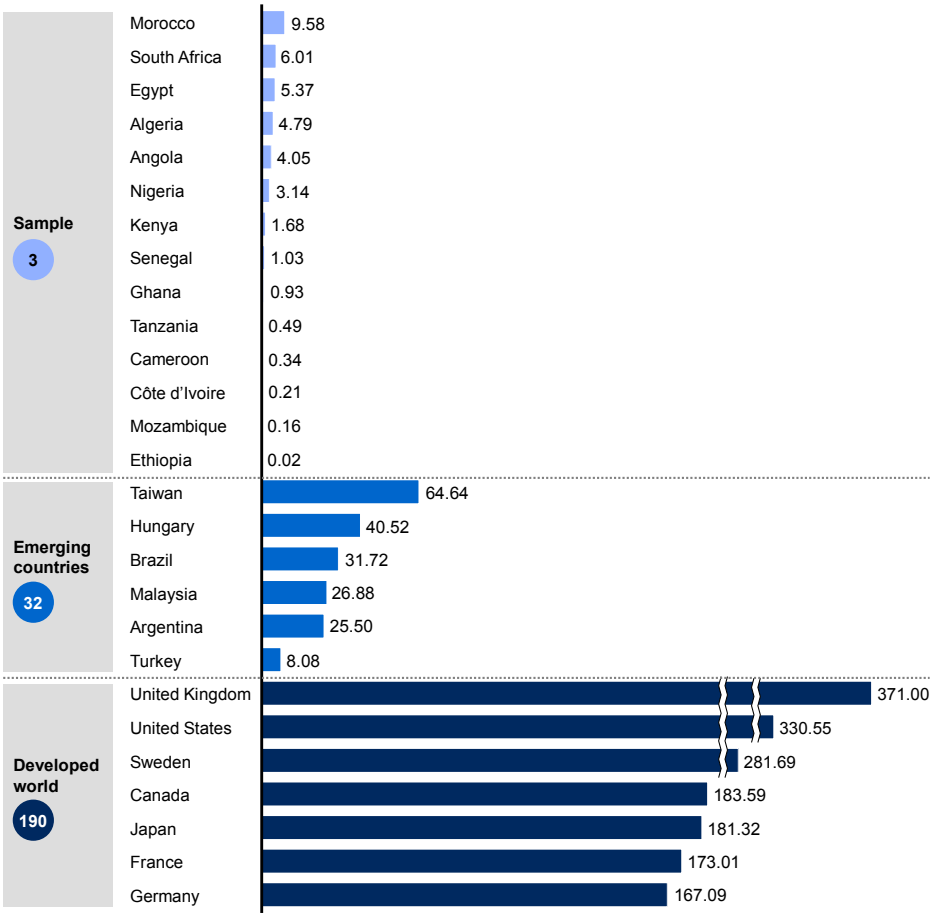
On a per capita basis, there is scope to increase public expenditure on the Internet from the current $3 per capita to $50 per capita as governments digitise their operations and move more services online. Africa's current leaders in public expenditure are Morocco ($9.58 per capita) and South Africa ($6.01 per capita), although even they lag behind countries such as Taiwan, Hungary, and Brazil (Exhibit 8).

Exhibit 8

Global comparisons reveal significant scope to increase public expenditure on the Internet

Public expenditure

$ per capita



SOURCE: McKinsey Global Institute analysis

Morocco has been focused on developing its ICT sector and expanding e-government services for several years. This momentum is likely to increase: in 2012, the National Telecommunications Regulatory Agency (ANRT) announced a ten-year infrastructure development plan that aims to create universal access to fixed or mobile broadband, including the build-out of 4G networks and increased fibre-optic cable to households. South Africa has had some notable successes in rolling out e-government programmes. Tax filing went from fully manual in 2006 to more than 99 percent of returns filed electronically in 2011, for example, and the "e-NaTiS" programme has shifted car registration, driver's licenses, and traffic news online, as well as creating a national vehicle database to combat theft. In addition, Nigeria is poised to increase public expenditure in the near term as the country carries out its recently approved national broadband strategy, which calls for expanding Internet access to 80 percent of the population by 2018 and migrating additional public services online (a move that is designed not only to increase Internet usage but also to bring greater transparency and efficiency to government).

Some countries have already launched efforts to bring the benefits of the Internet to education, health, and public services, with many more plans in the pipeline. Kenya, for example, has provided schools with computer labs and announced plans for additional educational ICT spending on initiatives such as teacher training and digitised content development. Ghana has plans to provide schools and universities with laptops. South Africa's Gauteng Province is distributing 80,000 tablets and connecting more than 2,000 public schools with Wi-Fi. (In projects such as these, however, it is critical to ensure that equipment reaches its intended recipients and that plans take into account training, replacements, and upgrades.)

Business spending on ICT services is also likely to ramp up: for example, ICT spending by Africa's SMEs stands at just 0.17 percent of GDP, half the level in Asia and one-twentieth that in North America, indicating substantial room for growth. Many of these businesses have limited access to IT services today, but as they digitise, tools such as email and enterprise systems will significantly boost productivity. In South Africa, for example, the airline industry has fully embraced online check-in and e-ticketing, banks are moving transactions online, and most major consumer brands have adopted social media strategies.

All of this points to rapidly rising demand for Internet access, which can be met if there is sufficient public- and private-sector investment in ICT infrastructure. Strides have been made in increasing international bandwidth, and as a result, peak utilisation dropped from 81 percent in 2009 to 64 percent in 2013. In sub-Saharan Africa, international bandwidth increased by 103 percent per annum to 650 Gbps, while peak utilisation increased by 86 percent per annum to 355 Gbps. Similarly, in North Africa, international bandwidth increased by 58 percent per annum to 812 Gbps, while peak utilisation increased by 53 percent per annum to 580 Gbps. However, there will need to be additional investments in building out fibre backhaul to improve download speeds. According to Speedtest.net, download speeds for our sample of 14 countries ranged from 1.12 Mbps in Algeria to 5.45 Mbps in Ghana.

Africa will also need more secure Internet servers. Within our sample, the number of secure Internet servers per million people ranges from 0.49 in Tanzania to 4.3 in Morocco. South Africa is far above the rest with 73.87 servers per million people.

Major infrastructure expansion is in the works across the continent, such as Maroc Telecom's plans to invest $1.2 billion in the next two years to upgrade its network and install fibre optics across Morocco. Senegal is building broadband infrastructure to connect landlocked West African countries to undersea cables, while Nigeria and Ghana both have additional submarine cables scheduled to go online by 2014. (In addition, Nigeria recently approved a new national broadband strategy to prioritise infrastructure development and extend high-speed mobile wireless coverage to 80 percent of the population by 2018.) Tanzania's national "backbone" project will create a terrestrial continuation of the fibre-optic Eastern Africa Submarine Cable System.

While 3G networks are already in place in all except nine countries across the continent, major investments have also been announced for high-speed 4G networks. Unitel, for example, is investing $1.35 billion through 2015 to modernise its network in Angola, and Smile Telecoms is rolling out 4G coverage in multiple countries. Kenya and Morocco are poised to award 4G licenses, and Rwanda has unveiled plans to provide high-speed 4G Internet to 95 percent of its population within three years.

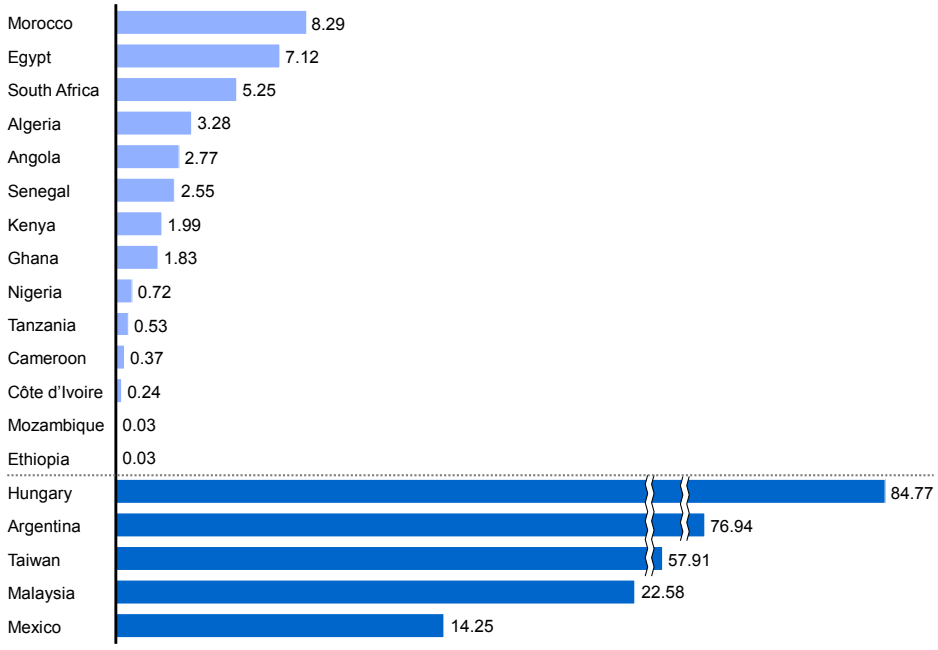
In addition, a wave of innovation is aimed at closing gaps in Internet coverage across the continent. Google, for example, is launching an initiative in South Africa to utilise unused channels on the TV spectrum to provide high-speed Internet. Microsoft has entered a partnership to create low-cost, high-speed wireless broadband in East and Southern Africa using TV spectrum white spaces and solar stations. Ushahidi, a Kenyan non-profit, is developing a product called BRCK, a device that can switch networks and power sources seamlessly, overcoming the constraints of an unreliable electricity supply.

Private investment is therefore likely to increase significantly, from the current levels of $2.45 per capita up to potentially $52 per capita, more in line with some of the emerging-market leaders (Exhibit 9). As infrastructure expands and speeds increase, more and more companies will embark on digitising their operations.

Exhibit 9

Private investment in Internet-related infrastructure and digitisation is significantly higher in other emerging markets

$ per capita



SOURCE: Gartner; IHS Global Insight; Organisation for Economic Co-operation and Development; International Telecommunication Union; International Data Corporation; World Health Organization; ICD; iConsumer US 2012; Euromonitor; H2 Gambling Capital; PhoCusWright; Pyramid Research; United Nations Educational, Scientific and Cultural Organization; McKinsey Global Institute analysis

Growing trade

Africa has a positive Internet-related trade balance, largely due to business process outsourcing ventures in South Africa and Morocco. In South Africa, BPO already generates more than $1.5 billion in revenue and accounts for 54,000 direct jobs, and Morocco also has a $1 billion BPO sector. Both countries have built solid reputations among international companies seeking to establish call centres and other service operations, and these services are likely to grow in the future. In addition, Ghana, Kenya, Nigeria, and Senegal are among the countries with plans and potential to build their own BPO sectors.

Africa could also become a bigger net exporter of Internet-related devices and services. In terms of hardware, some low-cost devices are already being designed and/or manufactured on the continent, particularly in Nigeria (for example, Veda laptops, MiFone) and South Africa (Netsurfer tablets). This trend is likely to grow: in 2013, for example, South Africa's Seemahale Telecoms announced the launch of locally designed, developed, and manufactured Android smartphones and tablets. In addition, Africa could become more reliant on local software that meets local needs; there are already a number of software development hubs.

It is therefore plausible that the trade balance could increase some sixfold, from $2 billion today to $13 billion in 2025. The challenges to achieving this growth will be creating a competitive advantage and developing human capital with the necessary technology and soft skills.

A wave of innovation and entrepreneurship

As the Internet expands across Africa, it has become a launching pad for new business models and a new generation of digital entrepreneurs. Some are building the foundations of this rapidly expanding Internet ecosystem by designing e-commerce platforms and social networking tools. Still others are rolling out innovative services and local content. This growing tech community will be an important force in developing the Internet ecosystem.[24]

Success stories are emerging across the continent. In Nigeria alone, Konga and Jumia have become major online retailers, iROKOtv has created a new channel for delivering movies and entertainment, Paga is emerging as a key player in mobile payments, and Jobberman has created a digital employment marketplace.

Some companies are already expanding their footprint across borders: Mi-Fone has sold more than a million low-cost mobile phones across the continent, while Smile Telecoms is rolling out 4G networks in multiple countries. Seven Seas Technologies is headquartered in Nairobi but offers IT consulting and services in markets throughout Africa.

As the smartphone market grows, apps will become increasingly important technology tools. But the African developer community is still very small, and as a result, most African companies turn to US and European app developers to expand mobile platforms. True Mobile, a Senegalese startup, aims to change that dynamic by developing apps locally and incorporating a better understanding of the African audience and marketplace.

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24 Maja Andjelkovic, "The future is mobile: Why developing country entrepreneurs can drive Internet innovation," *SAIS Review of International Affairs,* volume 30, number 2, summer-fall 2010.

A surge of entrepreneurial activity could produce the next wave of breakthrough companies. Some of the most exciting early-stage startups are part of the Harambe Entrepreneur Alliance. This network of young African entrepreneurs has produced a wide variety of businesses, with many focused on shaping the continent's digital future.

Incubators are springing up across the continent, from Kenya's iHub to South Africa's JoziHub to Cameroon's ActivSpaces. Nigeria has produced two notable examples: the Co-Creation Hub (or CcHub) and Wennovation Hub. CcHub aims to forge a community where tech innovators and social entrepreneurs can share ideas, expertise, and resources, while the Wennovation Hub takes an equity stake in promising ventures in return for facilities, mentorship, Internet access, legal services, and funding opportunities. Microsoft recently announced a partnership with three leading African incubator organisations to support startups and the developer community.

Not only is global investment growing, but local angel investor and venture capital networks are taking shape. In mid-2013, the entrepreneurs behind Nigeria's iROKOtv launched Spark, an investment fund focused on tech startups. The newly formed Angel Africa List offers mentoring along with financing, as does the Savannah Fund, which connects tech entrepreneurs and investors from Silicon Valley with startups in sub-Saharan Africa. The Tony Elumelu Foundation has an impact investing programme that focuses on innovative startups that can play a role in Africa's development.

□ □ □

The Internet has already changed the way much of the developed world interacts and conducts business, so it is startling to contemplate the fact that its impact in Africa may be even more profound. It has the potential to create business opportunities that could contribute billions of dollars to the continent's GDP, potentially spurring a leap forward in economic and social development. To achieve these gains, leaders in both government and business will have to make bold commitments to growth—and raise innovation and investment to unprecedented levels.

2. Opportunities for Internet-driven growth and productivity in six sectors

The Internet is beginning to assert itself throughout Africa's economies as it reshapes the way businesses and governments are run. Previous MGI research has found that the maturity of the Internet correlates with higher living standards—and the businesses that have successfully harnessed the Internet for value creation have largely done so by focusing on using it as a tool to boost productivity.[25]

Companies and organisations across the economy have the ability to harness the Internet to revamp their core operations. As costs come down, the widespread adoption of cloud computing, for instance, will give thousands of companies access to secure storage and infrastructure services, basic software (email, collaboration), and enterprise systems (payroll, billing, customer relationship management). Many of Africa's SMEs have limited access to IT services today, but cloud technology can allow businesses to reap the efficiencies of new technologies without tying up capital in IT systems.[26]

The largest economic and social impact of the Internet is likely to be concentrated in six sectors: financial services, education, health, retail, agriculture, and government (Exhibit 10). These sectors face specific service delivery challenges, information asymmetries, or market gaps that can be bridged through the use of Internet technologies. They also stand out because of the size of the population that stands to benefit from the efficiencies they could achieve.

Financial services and retail, for instance, can begin to reach new customer segments through online channels. The health-care sector can expand medical services to remote areas that currently have few health-care professionals and draw on real-time data to allocate resources and respond more quickly to disease outbreaks. Digital learning aids and course content are making their way into classrooms across the continent. And within agriculture, farmers are gaining improved access to markets and information through commodity exchanges and support services. Governments are also driving this trend, with a number of countries investing in e-government projects to digitise services.

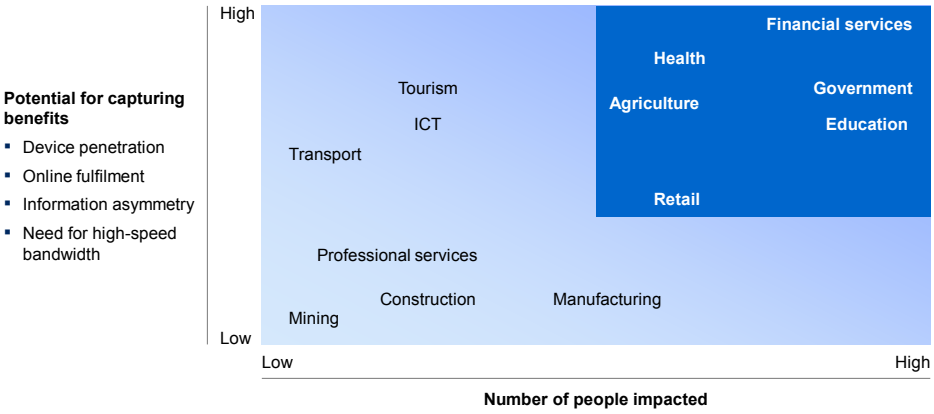
Technology-related productivity gains in these six sectors alone could reach $148 billion to $318 billion by 2025 (Exhibit 11), and as costs come down, products and services can be extended to reach populations that were excluded in the past. A number of exciting innovations are already unfolding in each of these sectors.

25 *Internet matters: The Net's sweeping impact on growth, jobs, and prosperity,* McKinsey Global Institute, May 2011.

26 *Disruptive technologies: Advances that will transform life, business, and the global economy,* McKinsey Global Institute, May 2013.

Exhibit 10

The Internet can have a transformative impact on six sectors in particular

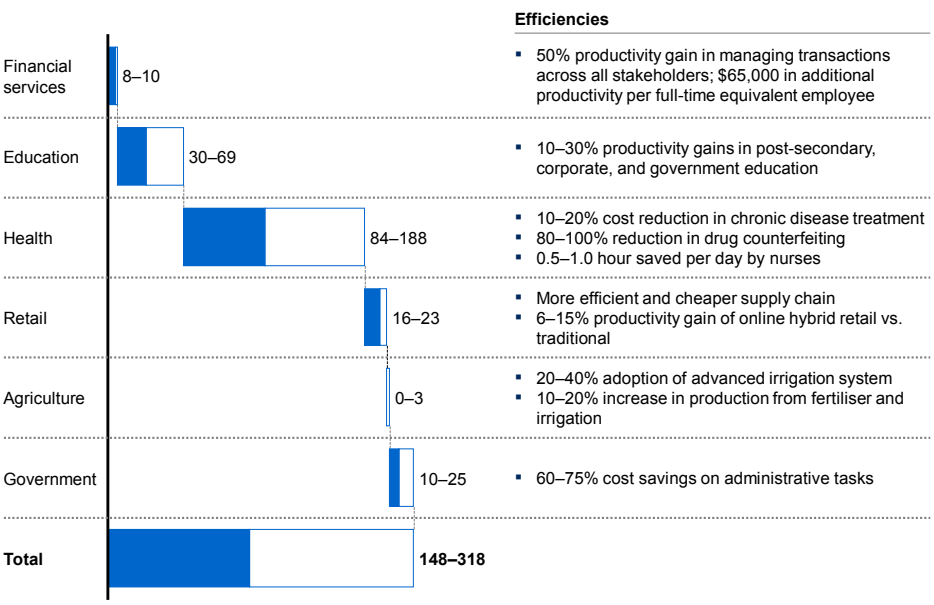


SOURCE: McKinsey Global Institute analysis

Exhibit 11

On top of its contribution to GDP, the Internet will create productivity gains across multiple sectors in Africa

Potential annual productivity gains in 2025
$ billion

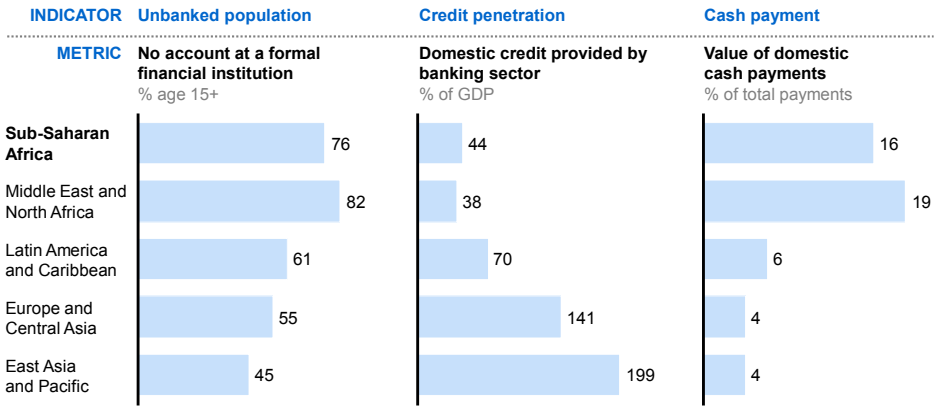


NOTE: Productivity gains do not include direct impact.
SOURCE: World Bank; McKinsey Global Institute analysis

Financial services

Africa continues to lag behind other emerging regions in financial sector development.[27] Despite the inroads made in mobile payments and money solutions over the past decade (most notably by Kenya's M-Pesa), more than three-quarters of adults in sub-Saharan Africa still lack accounts at formal financial institutions, hampering their ability to save and borrow. Domestic credit provided by the banking sector amounts to just 44 percent of GDP, a fraction of that in other developing regions (Exhibit 12). The picture is even starker in rural areas and less developed regions of Africa. The continent's low levels of financial inclusion and financial literacy, along with disparities within and between countries, are widely seen by governments and development agencies as obstacles to broadening the benefits of economic development.

Exhibit 12
Africa lags behind other regions on financial inclusion



SOURCE: World Bank; McKinsey Global Institute analysis

The traditional banking models that work in developed markets have not translated well to the African context. Vast distances and the sheer number of small rural villages present a critical challenge; the majority of Africa's unbanked population lives more than 10 kilometres from a bank branch or ATM. Because many Africans live in poverty, their average transaction value would be small, and this fact, combined with low population density outside urban areas, creates an unfavourable cost-benefit ratio for establishing a traditional network of bank branches and ATMs.

But mobile technology is already proving to be a breakthrough solution. With the right technology solutions in place, growth in financial services could be dramatic. By 2025, more than 60 percent of Africans could enjoy access to banking services, and more than 90 percent could use phone-based mobile wallets for daily transactions and remittances. In the 14 countries in our sample alone, we estimate that revenue from mobile financial services could increase almost 20-fold, from less than $1 billion in 2012 to $19 billion in 2025.

27 Franklin Allen et al., *Resolving the African financial development gap: Cross-country comparisons and a within-country study of Kenya,* World Bank Development Research Group, policy research working paper number 6592, September 2013.

As of June 2012, there were 81.8 million mobile money customers, of which almost 57 million were in sub-Saharan Africa. The most successful deployments have been in East Africa, where there are 48.5 million registered users and 9.7 million active accounts (compared to West Africa's 7.8 million registered users and 720,000 active accounts). In Kenya, Tanzania, and Uganda, there are more mobile money accounts than bank accounts.

Kenya's M-Pesa has been a notable success story. It started in 2007 as a simple P2P (person-to-person) platform for customers of Safaricom, Kenya's largest mobile network. It gradually added a range of other services, including airtime and electricity purchases, bill and salary payments, online shopping, remittances, and salary disbursements. In its first 18 months of existence, M-Pesa gained four million users, many of whom rely on a network of agents they can visit for deposits and withdrawals. Today, with 14.6 million users, M-Pesa is recognised as one of the most successful financial services innovators in the world.[28] For the first quarter of 2013, the value of M-Pesa mobile money transactions in Kenya exceeded $5 billion.

Building on its existing platforms and customer base, M-Pesa is introducing a suite of innovative micro-products. These include m-Shwari, which provides a vehicle for savings, and m-Kesho, which gives M-Pesa customers access to micro-insurance and micro-credit products.

Likewise, MTN, a leading African mobile operator with networks in countries across the region, launched Mobile Money as a simple P2P payments platform. MTN Mobile Money now embraces a range of person-to-business (P2B) and business-to-person (B2P) payments, including airtime and electricity purchases; it is used by millions of customers across Africa. MTN has partnered with major employers in Ghana to offer its customers salary advances through the KwikAdvance service, which they can access by text message.

Mobile network Tigo, which operates in seven African countries, launched Tigo Cash as a simple P2P payments platform for its customers, and added P2B and B2P payments similar to those of MTN. It has now expanded beyond mobile, launching Tigo-matic ATMs (initially in Rwanda). These offer customers the ability to make cash withdrawals and deposits, as well as to purchase airtime and SIM cards.

There is great potential for innovation in payment systems for smaller merchants through mobile point-of-sale apps such as Square. In Kenya, for example, India-based Ezetap has recently partnered with MasterCard and Equity Bank to allow small-scale retailers to accept credit and debit card payments via their mobile devices.

To capture the growth opportunities and expand banking services to populations that remain excluded from the formal financial system, the financial services industry will need to continue ramping up mobile as a channel. While Internet-capable phones and devices are becoming more widely adopted, most Africans still rely on basic mobile phones. To reach scale, at least initially, service providers must roll out basic technology systems that work on any phone, as M-Pesa has

28 See William Jack and Tavneet Suri, *Mobile money: The economics of M-Pesa,* NBER working paper number 16721, January 2011; and Ignacio Mas and Dan Radcliffe, "Mobile payments go viral: M-Pesa in Kenya," *Yes Africa can: Stories from a dynamic continent,* World Bank, August 2010.

done to gain traction. Additionally, financial services players will need to deliver rapid innovation in several key areas including:

- **P2P payments.** P2P mobile payment platforms are already ubiquitous in Kenya, but there are large opportunities to roll these out in markets where they have not yet reached scale, such as Mozambique, Nigeria, and Tanzania.

- **Micro products.** Financial service providers will need to move beyond offering the ability to make basic payments and begin to deliver a full suite of banking products online and on mobile phones and smartphones. These include micro-savings, micro-credit, and micro-insurance products, as well as a much broader range of payments including salaries, bills, and taxes. Micro-savings products based on mobile wallets can be developed across a range of categories, including targeted savings, longer-term savings, and community pooled savings. Even insurance products can be tailored to meet the needs of local customers. For example, Safaricom, UAP Insurance, and the Syngenta Foundation for Sustainable Agriculture created Kilimo Salama ("Safe Agriculture") in 2010 to enable small farmers in Kenya to purchase drought insurance. Farmers can buy the product via mobile phone when purchasing seeds and other products; even payouts are phone-based. Rather than assessing losses for individual farmers, payouts are made automatically on the basis of local weather station readings, contributing to the product's low-cost model.

- **B2P and P2B payments.** Even where high levels of P2P penetration exist, there is room to expand platforms for B2P (for example, salary payments and other disbursements such as insurance payouts and refunds) and P2B (for example, bill payments, point-of-sale payments, taxes, and loan instalments).

- **Interoperability.** Players will need to create seamless interoperability between banks, card associations, and other service providers. They will also need to make easy cross-border payments possible.

If the financial services industry can deliver such products across countries and socioeconomic groups, Africa could experience a true revolution in digitally driven financial inclusion. In Kenya, which has pioneered mobile money solutions, the share of adults using formal financial services has risen from 41.3 percent in 2009 to 66.7 percent in 2013.[29] But companies will also need to focus on educating consumers and building the broader ecosystem of agents and merchants. Many African consumers and small businesses have little or no exposure to formal financial and insurance products—and cashless, technology-driven solutions still seem alien. Through marketing and communications, service providers can promote financial literacy, especially surrounding issues such as how to manage credit. Simple, transparent plans with easy setup can provide successful entry points and build trust in these products. Governments can also find creative ways to boost currently low levels of financial literacy: in Somalia, for example, a pilot is under way to use a soap opera available through phones and on TV to communicate messages of financial education. The adoption of smartphones, tablets, and PCs will allow new models such as Mondabank, which makes personal financial advisers available via videoconferencing.

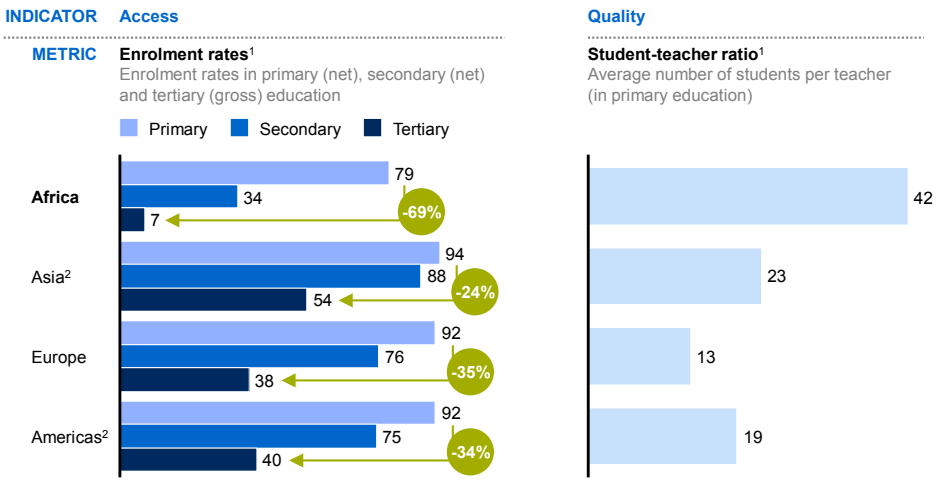
29 *FinAccess national survey 2013: Profiling developments in financial access and usage in Kenya,* Financial Sector Deepening (FSD) Kenya and Central Bank of Kenya, October 2013.

Regulation will also be crucial to building trust as mobile banking expands, and it will need to keep up with the rapid innovations that are under way in financial services and ICT. Service providers can address this by engaging regulatory authorities proactively. Governments can also play a role by driving the digitisation of their own payment flows, as well as providing incentives to digitise broader flows such as B2P, P2G, and B2G.

Education

As Africa's economies have grown, they have made tangible strides in educational enrolment and attainment. Yet the goal of delivering a high-quality education to every child in Africa remains an unfinished agenda (Exhibit 13). Primary school enrolment is 79 percent, nearing the rate in other regions, but there is a high dropout rate; in 2010, enrolment in secondary school was only 34 percent—and a mere 7 percent made it to tertiary institutions. The quality of classroom instruction is a concern, and student-teacher ratios are high (in fact, Africa's student-teacher ratio is double that of Asia and the Americas and more than triple that of Europe).

Exhibit 13
Africa lags behind other regions in education



1 Enrolment data from 2010; student-teacher ratio data from 2010.
2 Asia includes Middle East and Oceanic countries; Americas includes North America, South America, and the Caribbean.
SOURCE: World Bank; McKinsey Global Institute analysis

Today new digital tools have the potential to deliver rapid gains in access to education, teacher training, and learning outcomes. Much of this promise rests with the ability of the Internet to greatly broaden access to high-quality content and learning aids. In many regions, classrooms have limited access to up-to-date textbooks and learning materials. Students have started to gain the benefits of the world's best and most cutting-edge learning tools, delivered via mobile phones, tablets, or e-books. If the challenges of power and battery capacity can be overcome, these solutions could be scaled up. Tablets may become a cheaper option for supplying students with the materials they need, potentially reducing textbook costs. Mobile learning aids will also help students learn in bite-sized chunks while on the move, enabling them to use pockets of dead time. In addition, online teaching solutions create the possibility of scaling up the number of students that can have access to the best teachers, extending their reach beyond their immediate classroom via the Internet.

Some striking innovations are already under way. ReKindle Learning, a South African startup, is based on the premise that mobile devices are particularly well-suited to reinforcing content presented in the classroom through additional drill questions that students can follow at their own pace. It is piloting the use of these tools for various settings, including corporate training, financial literacy programmes for low-income communities, and the classroom. Also in South Africa, Yoza Cellphone Stories creates short, interactive stories that can be accessed through a feature phone; this has led to a 400 percent increase in the number of books read in beneficiary schools over four years, strengthening literacy efforts. Worldreader provides Kindle tablets with pre-loaded content in nine African countries (including Ghana, Kenya, Rwanda, South Africa, and Tanzania), leading to significant gains in standardised reading comprehension scores for primary students. Dr. Math connects South African tenth graders with a social network of tutors and fellow students, providing math exercises and tests that can be accessed on a basic mobile phone; it has increased users' math competency by 14 percent.

Greater connectivity also opens the doors to using the learning tools developed anywhere around the globe, such as the library of instructional videos and interactive exercises available through Khan Academy, a US-based non-profit whose mission is to provide "a free world-class education for anyone anywhere." Its modules, which are particularly strong in math, are gradually being translated into a wide range of languages. The Asante Africa Foundation, SAP, and Globalize Networks, for example, have partnered to translate 1,000 video lessons in math and science into Kiswahili and make them available by download to students in Kenya and Tanzania.

Major advances can also be made by strengthening the quality of classroom instruction. This can be achieved by creating widespread access to online training and qualification tools and by providing educators with supplementary materials to improve their teaching. The UNESCO and Nokia "English Teacher" programme, for example, provides primary school teachers in Nigeria with training and instructions on how to deliver content, as well as applications and tools to assist in classroom presentations. The programme combines in-person seminars with a service that sends teachers educational content and daily messages with pedagogical advice via their mobile phones; the messages are organised into thematic modules and include images and exercises.

Another key opportunity for improvement lies in strengthening learning management systems and assessment. Online tools will allow school systems and their non-profit partners to create transparency around performance, while online testing will support standardisation and monitoring. Khan Academy, for instance, is revolutionising assessment and monitoring; as students complete exercises, teachers receive real-time data on their performance and areas of difficulty.

Technology is also enabling innovations to deliver more affordable private schooling. Kenya's Bridge International Academies, for example, is a fast-growing chain of more than 100 nursery and primary schools with a mission to provide "knowledge for all" at an average cost per pupil of just $5 per month. Its model is based on a data-driven, technology-enabled "Academy-in-a-Box" that automates the vast majority of non-instructional activities in each school through a smartphone application. It then delivers well-honed curriculum and teacher

training material through a proprietary tablet application. Lastly, technology makes it possible for both public and private school systems to improve school management and reduce costs by standardising and automating fee collection, expense management, payroll, and admissions.

In order to realise significant educational gains across the continent, governments, non-profits, and the private sector will need to work together to provide the necessary resources and sustain momentum. Several major challenges will have to be overcome:

- **Infrastructure**. Many parts of Africa lack electricity or Internet connectivity, creating a real barrier to the penetration of digital learning tools. Solar power offers one viable solution for many locations, and new technologies have the potential to bring the Internet to Africa's rural schools and villages. But to reach African students and teachers at scale, SMS-based learning tools will have to be designed in the short term.

- **Access to devices.** The cost of smart devices remains beyond the reach of the vast majority of Africans. Rolling out education initiatives at scale will depend on the development of lower-cost devices. Partnerships involving private-sector technology companies, governments, non-profits, and donors can provide affordable laptops and tablets with greater capabilities. The Kenyan government, for example, has announced a plan to provide a simple laptop to every student entering primary school. Similarly, the Rwandan government has partnered with the One Laptop Per Child project; to date, it has distributed more than 100,000 laptops to students in more than 400 primary schools. In Nigeria, Veda has teamed up with other corporate partners to provide students and youth corps members with low-cost, locally manufactured laptops.

- **Buy-in from teachers and parents.** The human challenges are perhaps as great as the technological ones. Teachers could feel supplanted by technology and resist making full use of it unless they feel empowered as part of any shift toward digital learning, with their input informing its design and implementation. In Kenya, for example, the government is training 60,000 teachers on how to use technology and integrate digital learning into the classroom before it begins providing primary school students with laptops. Parents, too, may well be skeptical of educational technology and must be explicitly involved and engaged.

These challenges can all be surmounted if the right conditions are in place. One of the most crucial elements is the presence of ICT reform champions as part of transparent and competent leadership in the education sector. Scaling up digital learning initiatives and ensuring their effectiveness will require clear vision, strong coordination, measurable milestones, and ongoing monitoring, as well as a long-term plan for the continued use and upgrading of technology.

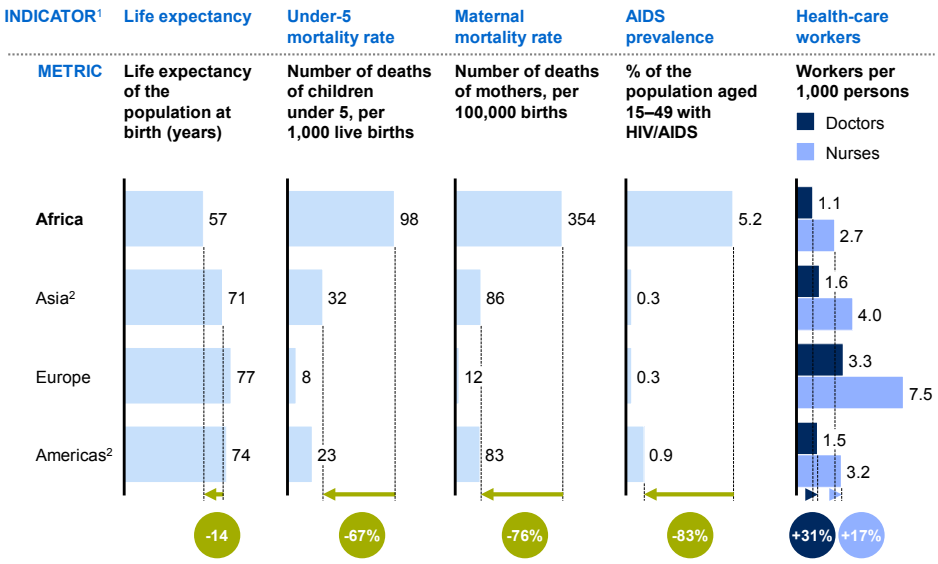
If existing "e-education" initiatives and experiments across the continent can be brought to scale, Africa could potentially close the educational enrolment and attainment gap with other emerging regions in just over a decade. Education spending accounts for a sizeable portion of most government budgets, and now Web-based school management systems and online testing can support standardisation and monitoring of school performance that will make this public

investment more effective. The technology-related productivity gains in education could reach $30 billion to almost $70 billion—enabling governments to achieve more with their education budgets and providing millions of students with the foundation for a better future.

Health

Africa has made considerable progress in improving health outcomes over the past two decades, but its indicators continue to lag behind those of other regions. While the continent's under-5 mortality rate has dropped substantially, it remains sharply higher than the rate in Asia or the Americas (Exhibit 14). And the continent continues to face a heavy burden from HIV/AIDS, malaria, and tuberculosis, despite intensive efforts over the past decade to tackle these diseases. In many regions, there is an acute shortage of doctors and other health-care workers. Millions of Africans lack access to medical care, whether because they cannot afford to pay for services or because they must travel long distances to reach the nearest clinic or hospital.

Exhibit 14
Africa lags behind other regions on key health indicators



1 Life expectancy data from 2010, under-5 mortality data from 2010, maternal mortality data from 2008, AIDS prevalence data from 2010.
2 Asia includes Middle East and Oceanic countries; Americas includes North America, South America, and the Caribbean.
SOURCE: World Bank; World Health Organization; McKinsey Global Institute analysis

The Internet could provide solutions to these challenges by enabling greater use of remote diagnosis, treatment, and education. There are major opportunities for progress in three main areas, where exciting innovations are emerging.

The first is telemedicine. The use of ICT to provide remote diagnosis, advice, treatment, and health education could address 80 percent of the health issues of patients in rural clinics, which are typically the most poorly staffed. This would revolutionise health care for large populations. It would simultaneously improve the efficiency of health spending, reducing the cost of treating chronic disease by 10 to 20 percent and saving an hour a day of nurses' time.

Several initiatives already under way illustrate the possibilities. Some of these are simple SMS-based solutions, while others employ more advanced technologies. In Senegal, for instance, Sonatel and Cisco have launched a pilot called HealthPresence. This software integrates high-definition video, advanced audio, third-party medical devices (such as glucometers, blood pressure monitors, and weight scales), and collaboration tools. It allows doctors to examine patients remotely, perform basic diagnoses, and issue prescriptions to patients in distant areas.

Telemedicine can also be used to promote health education and ensure that patients follow through on treatment regimes. Uganda's Text to Change project aims to increase public knowledge of HIV/AIDS prevention through text messaging, using a multiple-choice quiz for Celtel mobile subscribers in the rural region of Mbarara and offering free airtime as an incentive to participate. At the end of the quiz, a final text message is sent to encourage participants to go for voluntary testing and counselling at the local health centre. This project led to an increase of nearly 40 percent in the number of people coming in for free HIV/AIDS screening. In a scheme in Mozambique, tuberculosis patients receive daily SMS reminders to remind them to take their medication, which has raised compliance rates from the typical 22 to 60 percent all the way to 90 percent.

The second major opportunity lies in using the Internet to improve the efficiency and effectiveness of both public and private health systems. Tools are now available to streamline patient admissions, health records, supply chains, and document management. In South Africa, an innovative tool called HealthID is being rolled out by private health insurer Discovery Health to assist practitioners in caring for their patients. Subject to patient consent, the system aggregates the patient's medical history and gives the patient's doctor online access to a full health record. Qualcomm's Wireless Reach programme uses 3G connectivity to help local clinics in Kenya streamline the reporting that enables better supply management of antiretroviral medicines to treat HIV/AIDS. Paga, a mobile payments company, recently set up a payment system for a hospital in Ogun State, Nigeria. Within two months, the new system had collected payments equal to what the hospital had managed to collect in the previous 12 months.[30]

Online tools can also enable health system managers to monitor disease trends, performance, and readiness across facilities with much greater speed and accuracy so that shortages and problems can be addressed quickly. A platform developed by mPedigree, for instance, allows patients and clinicians to send a text message with a drug's identification information and instantly receive verification of the medicine's authenticity. This programme is being deployed to combat drug counterfeiting in Ghana, Kenya, and Nigeria.

Mobile innovations can play a particularly important role in containing disease outbreaks.[31] Nigeria's Mailafiya programme is a case in point. It collects and shares patient information through a central Internet-based database, where it is analysed to spot disease trends and mobilise responses. The availability of this

30 Xan Rice, "Nigerians begin to embrace mobile and Internet," *Financial Times,* October 10, 2013.

31 Seth Berkley, "How cell phones are transforming health in Africa," *MIT Technology Review,* September 2013; Caroline Buckee et al., "Mobile phones and malaria: modeling human and parasite travel," *Travel Medicine and Infectious Disease,* volume 11, issue 1, January-February 2013.

real-time data has significantly improved the allocation of health-care workers and medication to communities based on current needs. The Gambia's "SMS for Health" initiative similarly uses real-time information collected via mobile phones to track disease rates and medication stock levels, creating real-time reports to reduce stock-outs and supply-chain inefficiencies. In Botswana, the PING Disease Surveillance and Mapping Project has created a mobile phone application that allows health facilities to submit reports on outbreaks to the Ministry of Health, tag the data with GPS coordinates, and alert other nearby facilities by text message. The project has driven a 365 percent increase in on-time reporting by health facilities.

And the third major area for advancing health care is the use of online education for practitioners. This can range from more innovative delivery of initial medical training to ongoing dissemination of information on outbreaks, vaccination programmes, and other preventive initiatives. In Ghana, for example, traditional midwives receive text messages on warning signs that should prompt them to refer pregnant women in distress to the nearest hospital.

To unlock the Internet's full potential to improve health in Africa, and to bring existing "e-health" and "m-health" innovations to scale, governments, health providers, and technology players will have to overcome several difficult challenges. These include:

- **Complexity.** The health-care ecosystem in most countries is complex and fragmented, with multiple stakeholders that do not always share the same objectives. Imposing digital solutions on these ecosystems can be daunting, especially since the entity undertaking the investment does not necessarily reap the direct benefits. Telecommunications companies, however, are often well placed to provide integrated solutions; for example, the MTN Foundation, a non-profit venture of telecommunications company MTN, is advancing mobile health initiatives in Nigeria.

- **Funding models.** Most existing e-health and m-health innovations tend to be donor-driven and project-specific, so they are not easily exportable or scalable. To overcome this challenge, the private sector can develop commercial models that emphasise flexibility for different markets so that solutions are appropriate for people of all income levels. Public-private partnerships between governments and m-health providers are also needed.

- **Device access.** Africans still have limited access to smartphones, tablets, and computers. To address this, providers need to adopt a multiplatform approach that focuses on using text messages for initiatives that need to connect with patients and the public today, while developing applications for smartphones and tablets, which will have greater penetration in the future.

- **Patient confidentiality.** Protecting the confidentiality of patient information presents another challenge in a mobile context, as users often share phones within a family. This can be addressed by introducing basic authentication and privacy settings.

We estimate that the value of Internet-enabled efficiency gains across Africa's health systems could range from $84 billion to $188 billion a year—and the broader social and economic impact of improved health outcomes will be even greater.

Retail

Today, the formal retail sector is relatively underdeveloped across most of the continent, outside of South Africa. But the advent of e-commerce is opening up a new shopping experience for the growing middle class. It promises to deliver access to a far wider selection of goods, with better quality, convenience, and lower prices. The Internet will make it possible for customers to take control of their shopping experience, from search through to delivery and payment. This could create far greater impact in the lives of African consumers than it has in the developed world, which was already well covered by modern retail.

Opportunities abound for online retailers, who can use digital tools to target their marketing efforts to specific consumer groups and online channels to reduce the cost to reach and serve larger groups of customers. (Nevertheless, it should also be noted that Africans who have been exposed to traditional formal retail enjoy the experience.)

On a macroeconomic level, e-commerce can contribute to economic growth by spurring incremental consumption in locations where a lack of adequate brick-and-mortar options has created pent-up demand.[32] It also provides entrepreneurs and SMEs with a powerful launching pad and creates growth opportunities for "last-mile" logistics companies that can provide end-to-end supply chains for online retailers as well as other support services such as payments.[33] In Mozambique, for example, a startup called moWoza uses text messaging and a smartphone app to connect informal traders with available taxi drivers who can deliver parcels from wholesalers, creating a faster, mobile-based supply chain. The company ultimately aims to position itself as a mobile commerce player that can provide tracking and delivery services in cross-border trade. Paga, a Nigerian startup (also mentioned in the Health section), offers a variety of mobile payment solutions, from SMS and a mobile app to online payments. It also allows merchants to collect payments via mobile, Paga web portal, or an online e-commerce checkout process on their own sites.

E-commerce is still relatively new on the continent; less than 15 percent of urban Internet users shop online. However, a number of online operations are already innovating to address challenges with logistics and payments. It is worth considering a few of these companies and their business models in further detail for a glimpse into what the future of African retail could look like.

Jumia.com, which started in Nigeria and now also operates in Côte d'Ivoire, Egypt, Kenya, and Morocco, offers more than 100,000 products, including books, electronics, fashion, and home appliances. Orders are taken online or via SMS, phone, or agents. Jumia offers customers a variety of ways to pay, including credit and debit cards, bank transfers, and cash on delivery. Delivery is free in major urban areas, where the company employs its own delivery operation (it outsources to DHL in other areas). In 2013, Jumia was the first African winner of the World Retail Award for "Best Retail Launch of the Year" (an honour that has previously gone to ASOS, Migros, Niketown, and Zappos.com).

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32 *China's e-tail revolution: Online shopping as a catalyst for growth,* McKinsey Global Institute, March 2013.

33 *E-commerce in developing countries: Opportunities and challenges for small and medium-sized enterprises,* World Trade Organization, 2013.

Konga.com has aspirations to be the Amazon of Africa. Billed as "Nigeria's largest online mall," Konga offers a wide selection of fashion, electronics, books, housewares, personal care items, and much more, with free nationwide delivery and payment-on-delivery options in the largest cities. The company has built an extensive technology and logistics foundation, including a major fulfilment warehouse, and is moving toward making its site a marketplace platform.

Online marketplaces dominate e-tailing in China (where Taobao has more than six million e-merchants) and Latin America (where MercadoLibre operates in more than a dozen countries). Now they are also emerging in Africa, although currently on a much smaller scale. Nigeria also has WebMall, which gives customers access to a large number of "shops" via the WebMall website. Each retailer is responsible for displaying its inventory and managing its own promotions, and delivery is outsourced to FedEx. Afromania and OrderBay have created similar marketplaces with numerous suppliers on one platform.

Zando, a South Africa-based online fashion retailer, offers an extensive variety of international and local men's and women's clothing brands as well as its own brand. It offers free delivery within one to five days through a combination of its own fleet and outsourced couriers. Zando delivers more than one item to give customers the opportunity to try on and compare garments, and it offers free returns within 14 days.

Catering to a growing demand for entertainment options, iROKOtv offers online broadcasts and downloads of African music and movies, particularly those produced by Nigeria's burgeoning "Nollywood," which churns out around 40 films a week. It has more than 5,000 movies online and attracts more than ten million views from 500,000 unique visitors every month—from Africa and across the world. For customers who are not online, iROKOtv offers a DVD subscription service (for which it outsources logistics).

Despite this wave of innovation, no African e-tailer has managed to achieve scale across the entire continent; the space remains wide open. To capture the full potential of e-commerce in Africa, companies will need to overcome several challenges unique to the African context. These include:

- **Logistics and delivery infrastructure.** While some major urban centres are well-served by logistics companies, many Africans live in informal or rural settlements that lack clear addresses. (Even in urban centres, existing logistics solutions may not be cost-effective, leading retailers to develop their own services.) Some of those attempting to serve informal or rural communities have developed models that including delivering to the closest identifiable address, with delivery time and place arranged by phone. They also allow customers to pick up products at their warehouses. In addition, players have created their own delivery functions to guarantee delivery service levels.

- **A poorly developed payments industry and low banking penetration.** The lack of financial infrastructure makes cashless payments difficult to establish at scale, though mobile banking could provide a solution to this challenge (as discussed earlier in this chapter). To solve this problem, many e-tailers are using cash on delivery and mobile money payments. Some players allow customers to deposit cash at bank branches or pay at an agent or store counter. Payment issues are a major hurdle, as current solutions (especially cash on delivery) generate significant cost increases.

- **Limited consumer awareness.** Although e-commerce is resonating with many middle-class consumers, others lack awareness of online shopping and may be hesitant to trust e-tailers with payments. To build awareness of their online channels, e-tailers such as Zando and Jumia have created a physical presence at markets and malls, offering free Wi-Fi in return for customer data and establishing a physical sales force armed with tablets that will walk consumers through the online experience, even identifying items to order later by text message or phone.

By 2025, e-commerce could account for 10 percent of retail sales in Africa's largest economies. This would translate into some $75 billion in annual online sales and advertising revenue. At the same time, the Internet will enable substantial productivity and efficiency gains in the retail sector, through cost savings, strengthened supply chains, and digitised payment collection. The potential technology-related productivity gains in the retail sector could be worth $16 billion to $23 billion annually by 2025.

Agriculture

It is hard to overstate the importance of agriculture in Africa's economies: the sector provides 70 percent of the continent's employment and contributes 30 percent of its GDP. Productivity and growth from agriculture are vital to reducing poverty.[34] Significant efforts are under way across the continent to grow agriculture's output, value, and social impact, and the Internet could accelerate these efforts, producing up to $3 billion in annual productivity gains in the sector.

Nigeria has produced a success story in its agricultural sector by incorporating mobile technology into its Growth Enhancement Support Scheme (GES). Under the old system for distributing government subsidies for fertiliser, only 11 percent of farmers actually benefited, and huge sums were lost due to corruption. The new programme, launched in 2012, sends subsidy vouchers to farmers' mobile phones and directs them to the nearest dealer for redemption. The "e-wallet" programme has made distribution more efficient and removed opportunities for corruption. It has already achieved major savings, expanded the number of farmers served, and far exceeded its production targets.[35]

The Internet can increase farmers' access to expertise and information on everything from weather, crop selection, and pest control to management and finance—and make this support available throughout the farming lifecycle. Pioneering initiatives that use the Internet to provide such information to small-scale and subsistence farmers are already achieving considerable impact. For example, Kenya's iCow is an agricultural platform developed for small dairy farmers with online and mobile phone-based information and educational videos. It has been credited with increasing milk production by 30 percent among its users.

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34 *Sub-Saharan Africa: Keeping the pace, Regional economic outlook*, International Monetary Fund, October 2013; *Agriculture sector strategy 2010-2014,* African Development Bank Group, January 2010.

35 Speech by Dr. Akinwumi Adesina, Nigerian Minister of Agriculture and Rural Development, at the 36th session of the IFAD Governing Council, Rome, February 2013 (www.ifad.org/events/gc/36/speech/nigeria.htm).

Other existing initiatives are telephone-based but could achieve greater scale online if Internet penetration grows. Uganda's Farmers Call Centre provides farmers with expertise—in four languages—on topics such as crops, livestock, weather, market information, and input suppliers. M-Kilimo information services, launched by KenCall (Kenya's largest call centre) provides a 24-hour hotline to tens of thousands of small farmers on topics ranging from weather to livestock to pricing.

The Internet can also improve access to markets, and so generate better prices for produce and livestock. A pioneer in this area is Esoko, which provides weekly advisory services to farmers in many African countries through mobile phones, enabling them to negotiate better prices, choose different markets, or time sales. Esoko also allows farmers to receive and accept bids for their produce, and participating farmers have increased their revenue by 20 to 40 percent. In addition to linking farmers to local markets, the Internet is connecting smallholders to international markets. Coffee farmers in East Africa and cocoa producers in West Africa, for example, can follow the commodity exchange in New York on a daily basis via the Internet and mobile phone. The Internet is effectively levelling the playing field as the farmer becomes empowered to demand fair prices based on international markets. There is tremendous potential to scale such interventions as Internet penetration and usage grow, although initiatives that increase price transparency and match buyers and sellers may fall afoul of existing laws governing competition. This regulation may need to be modernised to allow for aggregation and sharing of data.

As they go online, existing agricultural exchanges across the continent could grow in scale, sophistication, and impact. The Ethiopia Commodity Exchange (ECX) already provides a virtual marketplace, accessible online and by phone and SMS; it improves transparency on supply, demand, and prices, and increases farmers' share of revenue. The ECX receives more than one million requests per month for market information, with 80 percent coming from rural areas. As the Internet brings greater transparency, the producers are able to see the price difference between different grades and commodities so they can make more informed decisions on what to plant and can see the quality premium and discount associated with post-harvest production. Likewise, the Agricultural Commodity Exchange in Malawi allows farmers to submit bids and offers online. The East Africa Exchange goes one step further, providing a virtual trading platform, building a regional market, and improving price transparency for farmers across six countries. It also provides support services such as warehousing, logistics, and market intelligence on stockpiles and expected yields of key crops.

Internet-based agricultural platforms also have the potential to drive up demand for Web access, and thus support infrastructure rollout in rural areas. This is exactly the effect that Senegal-based Manobi had on mobile networks: the initiative, which provides weather and pricing information to fishermen via SMS and WAP, has directly assisted with extending network coverage to remote areas.

Technology-driven agricultural services have already shown their ability to improve crop yield, expand access to markets, and boost revenue for farmers—thus improving livelihoods and boosting the broader economy. Such services could also create a valuable market in and of themselves, growing to some $3 billion a year across Africa by 2025.

Scaling up is a difficult issue for most existing services, due in part to a shortage of technical skills. One approach to filling the skills gap is to outsource product development work to business incubators—but to achieve broader scale, government support may often be required.

The private sector will also need to innovate to create new revenue streams by including other services, such as warehousing and logistics, micro-financing, insurance, or market information. However, governments may also need to play a role in funding Internet-powered agricultural services, potentially through public-private partnerships with commodity exchanges.

Penetration of smartphones and tablets among African farmers remains low, so many of the projects to date have been limited to basic mobile platforms and text messaging. This will change over time, but the short-term solution is to adopt a multiplatform approach that places primacy on SMS messaging to achieve maximum product recognition, scale, and impact while developing applications that can work on more sophisticated devices as smartphone and tablet penetration grows in the future.

Government

The Internet is a powerful tool for improving transparency and boosting the productivity and effectiveness of government agencies, as well as connecting citizens with information. Specifically, Web-based technologies can be used to increase convenience and access to services, reduce the cost and time of processing (for example, passport applications and tax returns), and increase the government's effectiveness in collecting revenue.

While overall technology adoption by African governments remains low, several have already moved important departments and services online, generating increased revenue while streamlining processes. An "e-filing service" introduced by the South African Revenue Service, for example, creates a simplified process for filing tax returns online and gives taxpayers quick access to their tax history. This effort has greatly reduced the administrative burden on both the revenue service and the taxpayer, improved turnaround times for refunds and penalties, and delivered gains in accuracy. Since its introduction in 2003, e-filing has become the preferred mode of tax submission for 5.5 million South African taxpayers and has contributed to significant improvements in revenue collection. Similarly, the Nigeria Immigration Service web portal allows citizens to apply for their passports online, then allocates a date for their interview and eventual passport collection. This has significantly reduced waiting times for documents to be issued and eliminated many wasted trips for passport collection.

In terms of providing greater transparency, the Kenyan government has implemented the Business Keeper Monitoring System, an automated corruption reporting system. Previously, corruption reports from whistleblowers were sourced through 6,000 offices around the country and processed by a central team. With the new system, two-thirds of all reports are generated online and processed automatically. Nigeria has introduced a Government Integrated Financial Management Information System (GIFMIS), which is producing major savings by eliminating unplanned borrowing and identifying duplicate accounts.

Across the continent, there are opportunities to build on these pioneering initiatives and expand the range of government services that can be delivered or tracked online. Today we estimate that only 12 percent of Africa's government departments are online, leaving the majority dependent on lengthy processes that face considerable risk of leakage and inaccuracy. By 2025, it is possible to envision that half or more of all government departments in Africa will have automated information systems—and all customer-facing departments will have an online presence, allowing citizens to access services at the touch of a button.

If this unfolds, we estimate that Africa's public services could achieve annual technology-related productivity gains of between $10 billion and $25 billion per year by 2025 through measures such as digitising the management of public records and using enterprise resource planning. Moreover, the end-to-end digitisation of revenue collection, including taxes and fines, would likely strengthen African governments' revenue collection substantially.

To bring a wider range of public services online, Africa's governments will have to prioritise access to electricity, Internet coverage, and devices so they can connect with the public.

Governments will also need to establish a coherent ICT strategy and cultivate technology skills for key roles, including systems engineers, IT maintenance workers, and administrative staff who can work proficiently in a digital environment. To address this challenge and create momentum for the initial online migrations, governments may need to engage private-sector ICT expertise to develop strategies and provide in-depth, ongoing support. Although many governments are already shaping strategies for online public services, they will need a clearer view of the funding requirements for these strategies, how implementation will unfold, and where the required skills will be found.

□ □ □

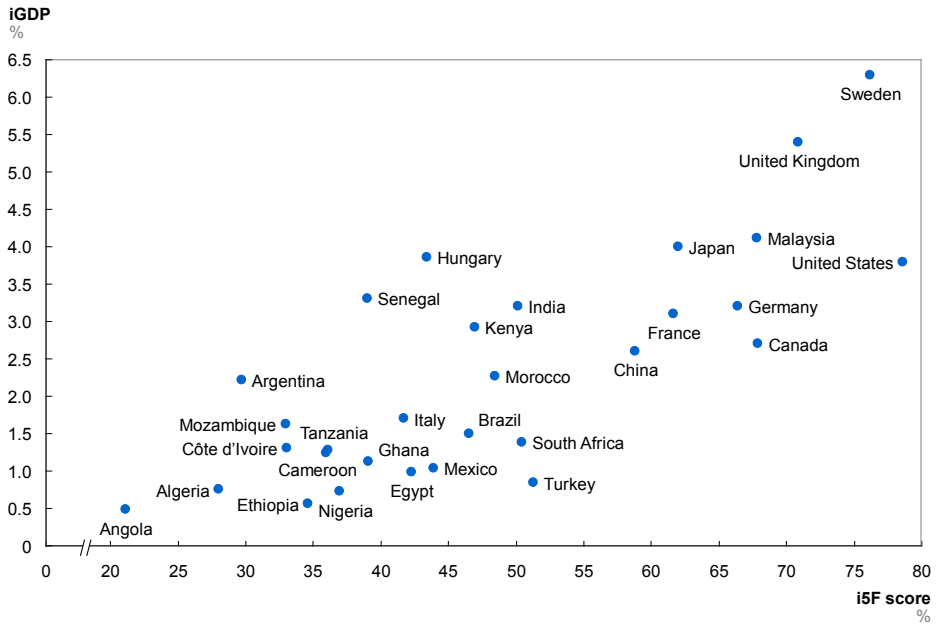
The six sectors profiled here could transform the continent if they undergo a digital revolution. Not only are innovative business models emerging, but existing companies are streamlining processes, speeding up transactions, tightening supply-chain management, and accessing wider markets. New tools are available to make a leap forward in the quality and availability of health care, education, and public services. Africa can realise major productivity gains—which in turn will translate into higher living standards and greater opportunity across the continent.

3. Assessing each country's path

The current development of the Internet (as measured by iGDP) varies across our set of sample countries. Some are much further along the path of Internet-driven growth than others. In addition, the specific steps needed to unlock the Internet's economic development potential vary depending on the strength of each country's Internet foundations.

To develop a strong Internet ecosystem, public and private attention must be focused on both supply and demand. Infrastructure is critical and usually receives the bulk of public and private investment, but there are other important components of a healthy and vibrant system. McKinsey has developed the Internet Foundations Index (i5F) to assess the strength of these fundamental pillars, generating an overall score for the country's Internet "readiness"—a score that correlates closely with current iGDP (Exhibit 15).

Exhibit 15
i5F and iGDP are closely correlated



SOURCE: McKinsey Global Institute analysis

The five foundations that must be in place are:

- **National ICT strategy.** This includes creating a coherent, pragmatic strategy as well as a regulatory environment that can support it and attract infrastructure investment. Another aspect is a willingness by governments to embrace the openness and increased access to public information that the Internet brings.

- **Infrastructure.** This is a measure of the removal of the physical barriers that inhibit growth of the Internet. It is affected by factors such as the reliability of electricity supply, data networks, international bandwidth, download speeds, and the availability of secure Internet servers.

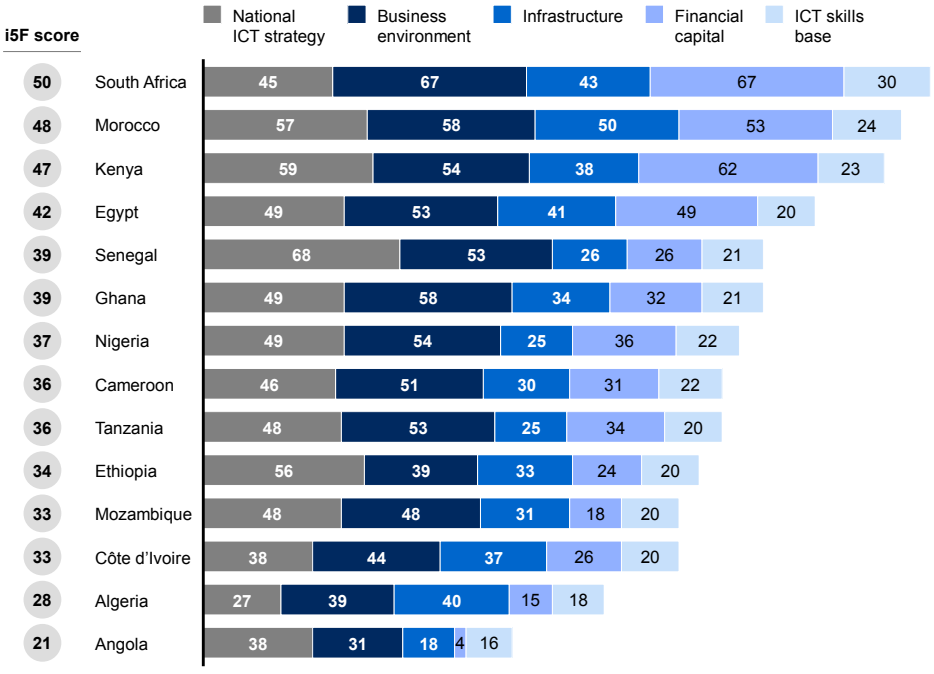
- **Business environment.** A supportive business environment will encourage Internet entrepreneurs. Key factors include the processes required to set up a business and effective competition policy.

- **Financial capital.** This includes access to loans, venture capital, and equity financing.

- **ICT skills base.** It takes qualified professionals to drive ICT initiatives forward in both the private and public sectors, and developing this workforce depends on factors such as the quality of math and science education and enrolment rates in tertiary education.

These five pillars can be measured by analysing 31 indicators (see the methodology in the appendix for a detailed list). The results are then combined to yield an overall i5F score for each country (Exhibit 16).

Exhibit 16
i5F scores by country
Score per i5F dimension
%

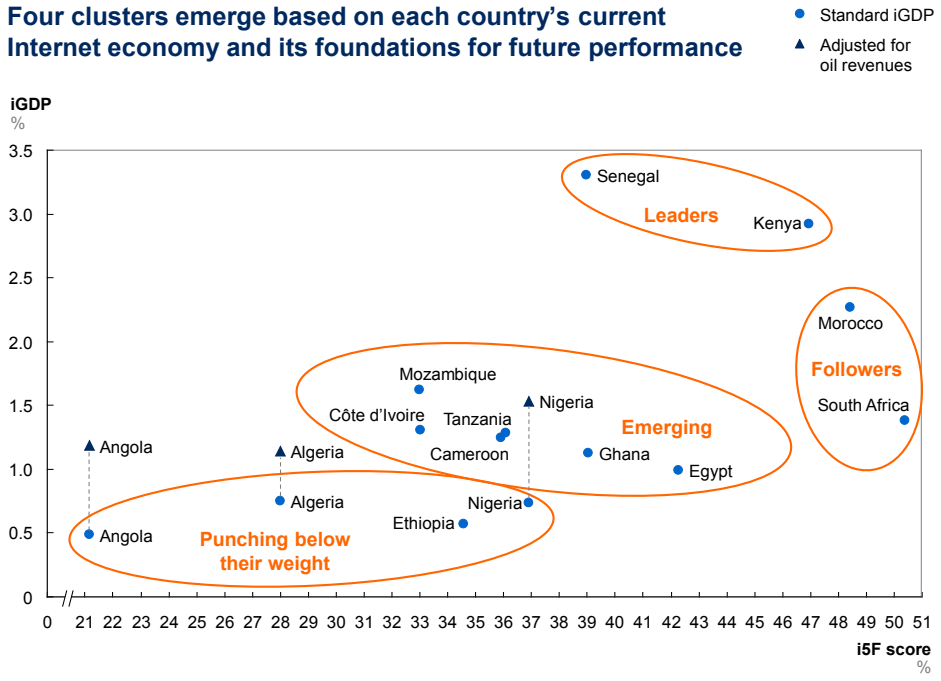

i5F score
National ICT strategy
Business environment
Infrastructure
Financial capital
ICT skills base
50 South Africa 45 67 43 67 30
48 Morocco 57 58 50 53 24
47 Kenya 59 54 38 62 23
42 Egypt 49 53 41 49 20
39 Senegal 68 53 26 26 21
39 Ghana 49 58 34 32 21
37 Nigeria 49 54 25 36 22
36 Cameroon 46 51 30 31 22
36 Tanzania 48 53 25 34 20
34 Ethiopia 56 39 33 24 20
33 Mozambique 48 48 31 18 20
33 Côte d'Ivoire 38 44 37 26 20
28 Algeria 27 39 40 15 18
21 Angola 38 31 18 4 16

SOURCE: McKinsey Global Institute analysis

We analysed a sample of 14 countries that together account for 90 percent of Africa's GDP.[36] Their average i5F score is 37 percent, which compares to 50 percent for other emerging economies and 66 percent for developed economies.[37] Mapping each country's iGDP against its i5F score results yields four clusters of countries, indicating their relative levels of Internet development (Exhibit 17). Each cluster has common challenges and pathways that we will explore in greater detail in this chapter. The specific steps needed to unlock the Internet's economic development potential vary considerably depending on these starting points.

Exhibit 17

Four clusters emerge based on each country's current Internet economy and its foundations for future performance



SOURCE: McKinsey Global Institute analysis

LEADERS: KENYA AND SENEGAL

Among our sample of 14 African countries, the two nations with the largest iGDP (or share of the Internet's contribution to GDP) are Senegal and Kenya. This is perhaps a counterintuitive finding, as they are not the continent's largest economies. But both governments have made it a priority to stimulate Internet demand, and therefore private consumption, which accounts for more than 85 percent of iGDP in each country. Even though Senegal has a higher iGDP today, Kenya may be better positioned for the future, given its trade surplus (0.3 as a percentage of GDP) and its track record of working closely with the private sector to drive investment (see Box 4, "Kenya's strategy for ICT success", in Chapter 4).

It is worth noting that Kenya and Senegal do not lead the sample on overall i5F scores, but their high scores on the dimension of national ICT strategy alone could have been the impetus for their iGDP today. (Senegal's government, for

36 Countries included in the sample have populations exceeding 12 million, GDP exceeding $12 billion, and GDP per capita exceeding $500.

37 The emerging economies in this sample are Argentina, Brazil, China, India, Malaysia, Mexico, and Turkey. The developed economies are Canada, France, Germany, Hungary, Japan, Sweden, the United Kingdom, and the United States.

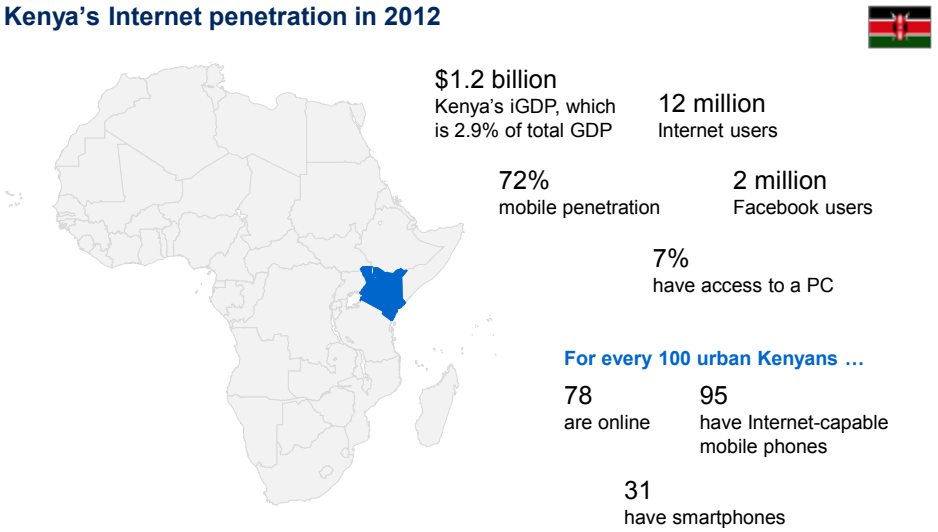
instance, was one of the first on the continent to invest in fibre-optic networks and prioritise the rollout of Internet cafés. Its e-government project has directed resources to digitising education, public administration, and health-care services.) To maintain their current lead, however, both countries will need to improve their infrastructure and cultivate workforce skills. Senegal will also need to enhance its business environment and focus on access to capital. These priorities could make their iGDP less dependent on private consumption and more in line with the iGDP of developed countries.

Kenya

With a GDP of $41 billion, Kenya is the largest economy in East Africa and a vital port of entry for goods destined for most East and Central African countries. After a decade of economic growth, however, it remains one of the world's poorest countries, ranking 145 out of 187 countries on the UN's 2013 Human Development Index. Inequality is also high; the bottom 10 percent of Kenyans together earn less than 1 percent of the national income, while the top 10 percent earn 44 percent.

Despite its economic challenges, Kenya is one of Africa's front-runners for Internet adoption and usage, with urban Internet penetration of 78 percent (Exhibit 18).

Exhibit 18
Kenya's Internet penetration in 2012



SOURCE: World Economic Forum; McKinsey Africa Consumer Insights Center survey, 2012; Internet World Stats; McKinsey Global Institute analysis

The Internet's reach is growing, as a look at urban usage patterns shows. Mobile penetration is almost universal in urban areas (but only 62 percent nationwide), with little variation across all ages between 16 and 55. Almost all urban phones are Internet-enabled, and 31 percent are smartphones, positioning mobile as the preferred platform for Internet access. Across devices, however, usage is dampened by slow browsing speeds. Social networking, email, and accessing music or videos are the most popular online activities among Kenyans (Exhibit 19).

Kenya's iGDP is $1.2 billion, which equates to 2.9 percent of the nation's GDP—and this share is comparable to those of France and Germany. Some 87 percent of this is driven by private consumption, which breaks down into 55 percent from broadband revenue, 21 percent from smartphone purchases, 15 percent from computer sales, 5 percent from mobile Internet, and 4 percent from e-commerce.

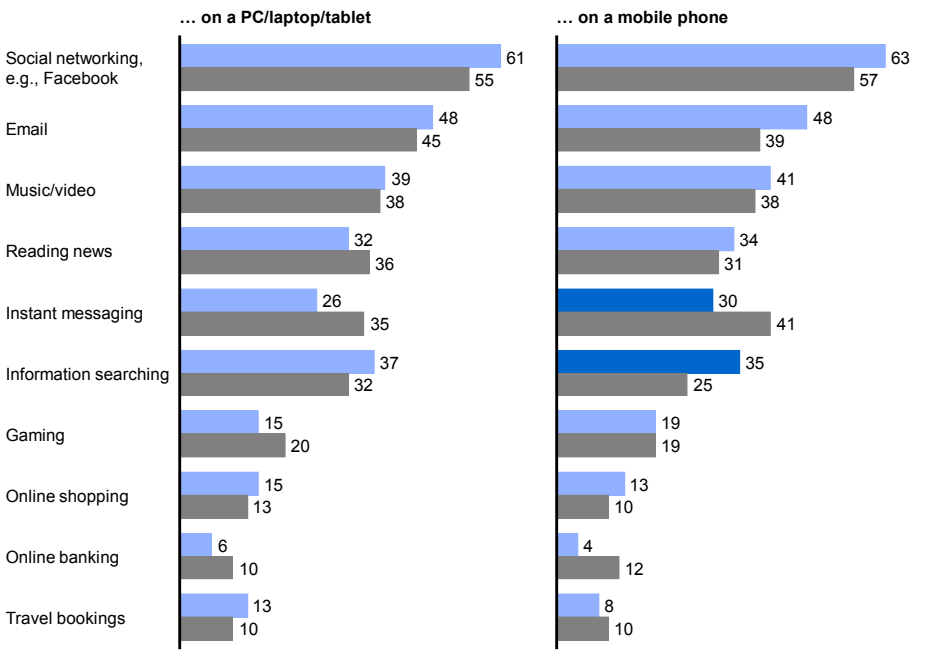
Although it has been recently reversed, the government's decision to remove VAT and import duties on handsets in 2009 resulted in a 200 percent increase in sales of phones and other Internet-capable devices. Safaricom also played a key role by investing in affordable access. The company set up a separate division to drive its data strategy, which included innovations such as M-Pesa, Wi-Fi in taxis, and a technology literacy drive.

Exhibit 19

Kenya's urban Internet usage profile

Question: How often do you do the following activities …

% of Internet users responding "Often"



SOURCE: McKinsey Africa Consumer Insights Center survey, 2012; McKinsey Global Institute analysis

Public expenditure is currently only 6 percent of iGDP, translating to $1.70 per capita. Less than a quarter of government services and information systems have gone online to date, but the Kenyan government has nevertheless implemented an ICT policy that shows its commitment to using technology for economic development. As a result, Kenya is continuing to invest in the national fibre backbone and has plans to roll out more e-government services, including the digitisation of hospital systems. It has also prioritised the introduction of technology in education and has partnered with Microsoft to deliver solar-powered laptops to students.

Private-sector investment in Internet-related technologies accounts for 7 percent of the country's iGDP, or $2 per capita. The establishment of Konza Techno City has attracted the likes of IBM, Microsoft, and Google to Kenya, where the burgeoning tech sector has been dubbed the "Silicon Savannah". The i-Hub incubator has led to the development of more than 150 businesses, such as Kopo Kopo (which develops mobile payment systems for SMEs) and eLimu (which is producing low-cost tablets for primary schools). In addition, Kenya is one of the three countries in our sample with an Internet-related trade surplus, and there is opportunity to further expand its BPO sector.

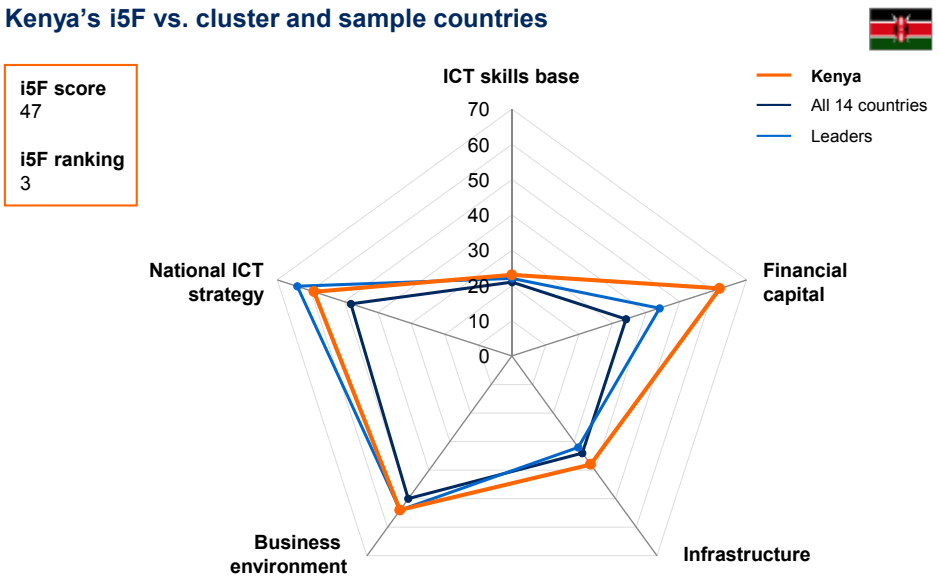
Kenya has also innovated in terms of services and technology and is recognised globally as a pioneer in mobile money solutions. Apart from the much-celebrated M-Pesa, Kenyans have embraced the MasterCard MPOS (mobile point of sale) solution, a lightweight device that can be plugged into smartphones and tablets to accept payments in accordance with global card industry security standards. Solutions such as these are introducing both consumers and retailers to cashless payments, which is usually the first step before the adoption of online payments.

Ushahidi, a Kenyan technology non-profit, has developed a device called the BRCK, which has been described as a "backup generator for the Internet". It aims to address the challenges of making connectivity more reliable—even when the power is out. The device is designed to keep users connected with minimal effort by moving seamlessly between wired ethernet, Wi-Fi, and mobile data zones and by switching to a robust built-in battery automatically whenever the power grid goes down.

Kenya's i5F score is 47 percent, which places it third in the sample after South Africa (50 percent) and Morocco (48 percent). In terms of Internet foundations, Kenya has a key advantage: its government is one of the most progressive in the region with regard to both technology-led development and the implementation of business reforms (Exhibit 20). Its policy initiatives have included the appointment of an ICT board that was empowered to shape a long-term national vision, facilitate investment, and encourage innovation in both the private and public sectors—and these efforts have yielded results in large part because of effective leadership and a focus on implementation. As mentioned earlier, the removal of VAT and import duties on handsets in 2009 drove demand and affordability. The government recently announced the reinstatement of duties and taxes, however, and the impact of this decision remains to be seen. Kenya's i5F score shows that it is one of the continent's leaders on most Internet foundations, but since the entire sample has relatively low performance on the human capital and infrastructure dimensions, there is still substantial room for improvement in both areas.

Exhibit 20

Kenya's i5F vs. cluster and sample countries



SOURCE: McKinsey Global Institute analysis

The government can enhance Kenya's prospects by focusing its efforts on developing the high-tech skills required to ensure growth. This will require specific interventions, as the tertiary enrolment rate is less than 4 percent. There are opportunities to increase the number of scientists and engineers and to increase collaboration between universities and industry.

Kenya will also need to make additional investments in infrastructure. The Communications Commission of Kenya has been set up to coordinate policies in this area, and awarding the nation's 4G license will help to improve last-mile connectivity. Kenya will also need to increase the number of secure Internet servers, since a shortage constrains the volume of reliable transactions that can take place online.

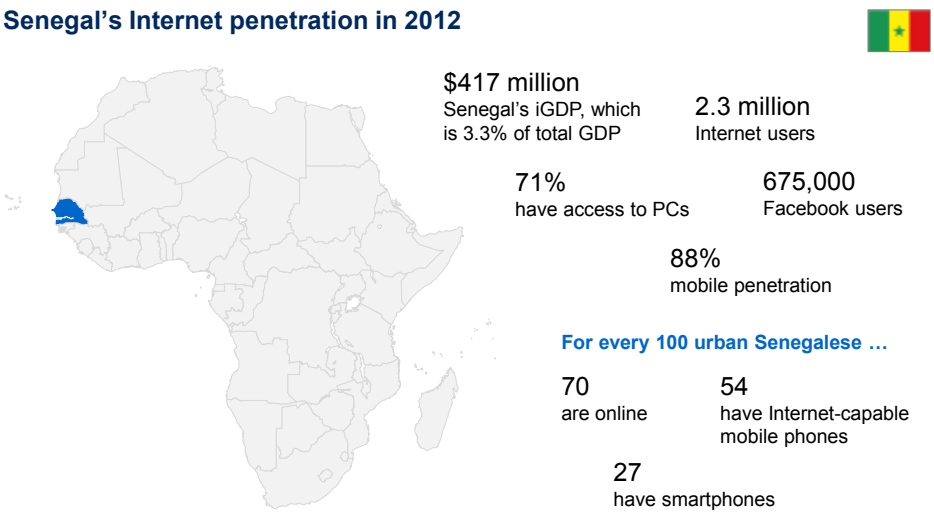
Senegal

With limited natural resources to export, Senegal had a 2012 GDP of $13 billion (only slightly above $1,000 per capita) and growth averaging 3.5 percent over the past six years. Tourism, retail, and civil service drive most of its economy. Yet this small country is one of Africa's Internet leaders (Exhibit 21).

Three mobile operators are present today: GSM providers Orange and Tigo, as well as CDMA provider Expresso Telecom. Orange Sonatel, which was privatised in 1997, is the only fixed-line operator.

Internet penetration in urban areas is high, with 70 percent of city dwellers using the Internet. Access has been mainly through PCs and laptops, typically in cafés or at work, although 54 percent of urban Senegalese own an Internet-capable phone (Exhibit 21). Senegal was a pioneer among African nations in establishing and prioritising Internet cafés, which are now ubiquitous across cities. However, things are changing fast, as the latest figures for 2013 suggest that fixed Internet is decreasing and 80 percent of all Internet access is now mobile.[38] Email and social networking are the top two uses, while online shopping and banking online have not yet been widely adopted (Exhibit 22).

Exhibit 21
Senegal's Internet penetration in 2012



SOURCE: World Economic Forum; McKinsey Africa Consumer Insights Center survey, 2012; Internet World Stats; McKinsey Global Institute analysis

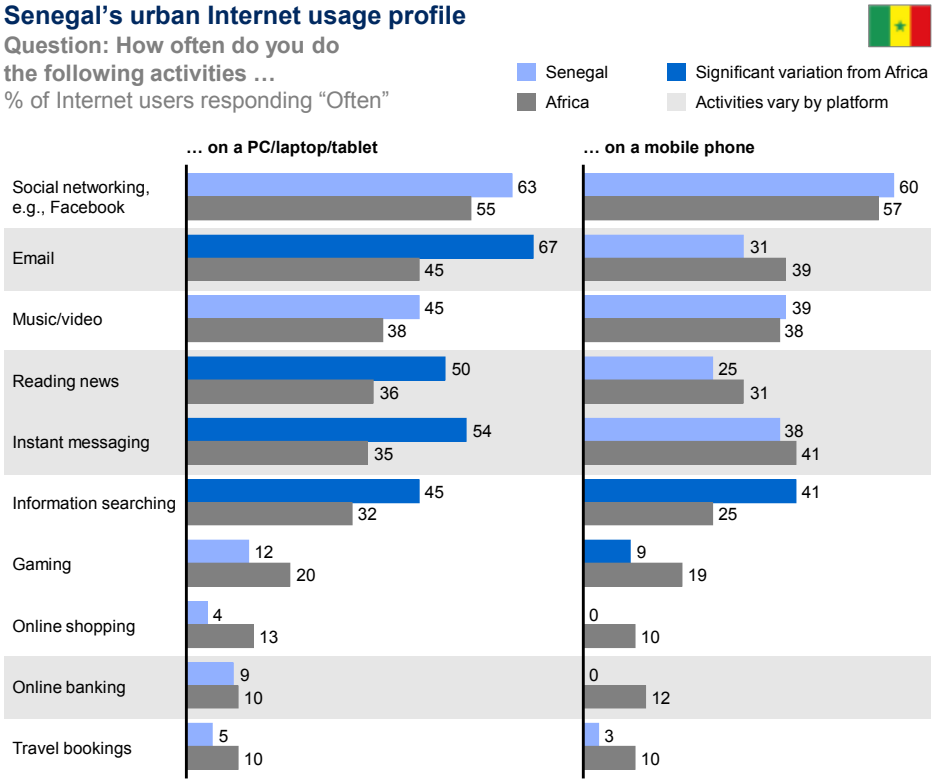
38 *Rapport sur le marché des télécommunications,* Agence de Regulation des Telecoms et Postes (ARTP), June 2013.

Exhibit 22

Senegal's urban Internet usage profile

Question: How often do you do the following activities …

% of Internet users responding "Often"



SOURCE: McKinsey Africa Consumer Insights Center survey, 2012; McKinsey Global Institute analysis

At $417 million, Senegal's iGDP equates to 3.3 percent of total GDP, the highest such ratio in Africa. While its iGDP is comparable to that of some advanced economies, the *composition* of its iGDP is very different, with 91 percent attributable to private consumption. PC sales and broadband revenue are the largest components of private consumption, which has been bolstered by a reduction of taxes on ICT-related goods. In addition, many employers offer Internet access as a fringe benefit to employees, and local media players are adopting the Internet as a key communication platform. Senegal's Internet cafés continue to innovate and have begun to replace PCs with tablets to deal with power supply constraints. For now, the share of e-commerce remains low, although the introduction of mobile payment platforms could pave the way to future growth. Orange Money (created by Orange and the bank BICIS) was the first of these. Mainly targeted to unbanked customers, it allows users to make deposits, withdrawals, and transfers; they can also purchase items in certain shops and buy Orange top-ups. Orange Money has now been joined by Yoban'tel, Wari, Seddoo, and Ecobank.

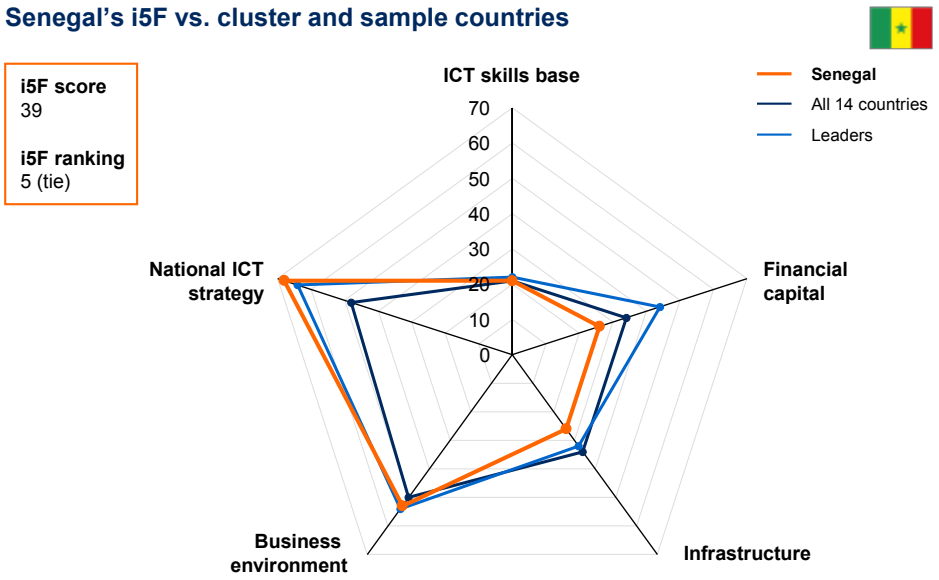
Public expenditure currently stands at 3 percent of iGDP, again much smaller than the African average, despite its e-government initiative, which aims to digitise education, health care, and public administration. This translates to $1 per capita, which ranks below Kenya, South Africa, and Morocco. The number of government departments and information systems that are online is still relatively limited. Private-sector investment in Internet-related technologies accounts for 8 percent

of iGDP, in line with the average across the sample countries and translating to $2.50 per capita. An initiative to provide Internet connectivity to Senegal's villages may increase future investment.

Despite sales of international bandwidth access to landlocked neighbour countries, Senegal imports technology products and services, leading to a slight Internet-related trade deficit.

Early adoption has positioned Senegal as one of the continent's leaders. The government's investment in the national fibre backbone made Senegal one of the first countries on the continent to deploy fibre-optic terrestrial systems. President Abdou Diouf was at the forefront of ICT development, and his successors have continued to prioritise these efforts as a tool for accelerating economic growth. However, Senegal will need to strengthen its Internet foundations if it is to sustain this position (Exhibit 23).

Exhibit 23
Senegal's i5F vs. cluster and sample countries



SOURCE: McKinsey Global Institute analysis

Senegal has an i5F score of 39 percent, which ties with Ghana for fifth in our sample. Its score is bolstered by strong government prioritisation, as noted above, but there are gaps to be addressed on the other dimensions (in particular, human capital, financial capital, and infrastructure). Senegal will need to bridge the rural-urban infrastructure divide and increase download speeds and the number of secure Internet servers. There is an opportunity to develop a significant Francophone BPO industry, but this will require initiatives to develop a skilled workforce, starting with improving enrolment rates in secondary and tertiary education and increasing the number of scientists and engineers. Finally, Senegal will need to emphasise improving access to capital.

FOLLOWERS: MOROCCO AND SOUTH AFRICA

Both Morocco and South Africa lag behind Kenya and Senegal in terms of iGDP, although they have more balanced iGDP profiles. They are the leaders in trade surplus, thanks to strong business process outsourcing industries. Morocco's slightly better performance could be explained by its higher levels of private investment and public expenditure, and thus better infrastructure.

Morocco and South Africa also have the strongest Internet foundations, particularly in terms of business environment and financial capital. The presence of these building blocks indicates potential for growth. To fully leverage these advantages, both countries may need to strengthen ICT skills development, infrastructure, and national ICT strategies.

Morocco

Morocco is becoming an increasingly competitive economy, with a GDP of $97 billion, more than half of which is driven by services. Since the early 2000s, Morocco has averaged a steady 5 percent annual growth rate.

Against this backdrop, Morocco's telecom industry has posted 15 years of strong growth (averaging annual gains of some 6 percent). Growth was flat in 2011–12, however, at $4.2 billion in revenue.

Morocco has the highest Internet penetration in Africa (approximately half of Moroccans were online in 2012, compared with the African average of 16 percent). A closer look at the urban penetration rate of 52 percent shows that there is some room for growth given, for example, Kenya's 78 percent urban penetration rate (Exhibit 24). Internet usage is widespread among all generations of Moroccans. Nevertheless, Internet usage remains highest for the 16-to-24 age group, and social networking is the most popular online activity (Exhibit 25).

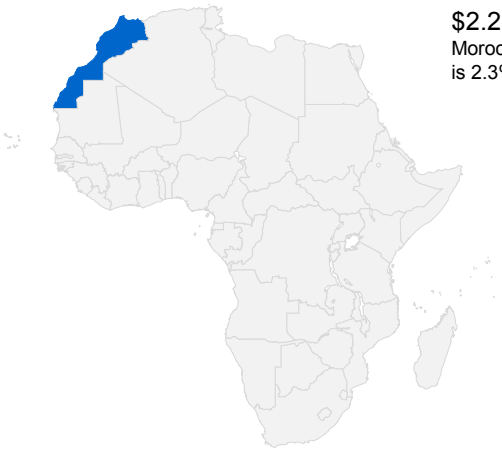
Urban consumers go online for social networking, email/instant messaging, and music and video sites (which Moroccans use more than the average African consumer). However, there is limited use of services such as online shopping, online banking, and travel bookings. In many African countries, mobile Internet has leapfrogged access by PC, but not so in Morocco, where the majority of daily Internet users go online with a PC or laptop.

Morocco's iGDP is $2.2 billion, or 2.3 percent of the country's GDP. Private consumption contributes almost 34 percent of this, including mobile Internet (24 percent), computer sales (23 percent), broadband revenue (19 percent), smartphone sales (6 percent), and only 0.5 percent from e-commerce. This could change in the future given the launch of group buying sites such as Mydeal.ma and Hmizate.ma and online auction site Clicoo.ma, but vendors will need to establish greater consumer trust in e-commerce online transactions.

Morocco's public expenditure on Internet activities is $309 million, corresponding to 14 percent of its iGDP. This translates to $9.60 per capita, the highest per capita spending in the sample. Maroc Numeric 2013, a five-year plan launched in 2008, focused on increasing Internet penetration, expanding e-government, and developing an IT sector. In late 2012, the government announced a new ten-year plan for universal broadband. Currently e-government initiatives include registration of new businesses, filing employee social benefit claims, and filing enterprise corporate and income taxes—and Moroccans acknowledge these

have increased convenience and transparency. In a recent study conducted by Morocco's regulatory agency, 36 percent said that e-government initiatives have reduced administrative paperwork and 27 percent believe they are removing corruption. What's more, the Internet today ranks second in the channels used by Moroccans to interact with government.[39] However, there is room for more government departments and systems to go online.

Exhibit 24
Morocco's Internet penetration in 2012



$2.2 billion
Morocco's iGDP, which is 2.3% of total GDP

16.5 million
Internet users

120%
mobile penetration

5.1 million
Facebook users

For every 100 urban Moroccans …

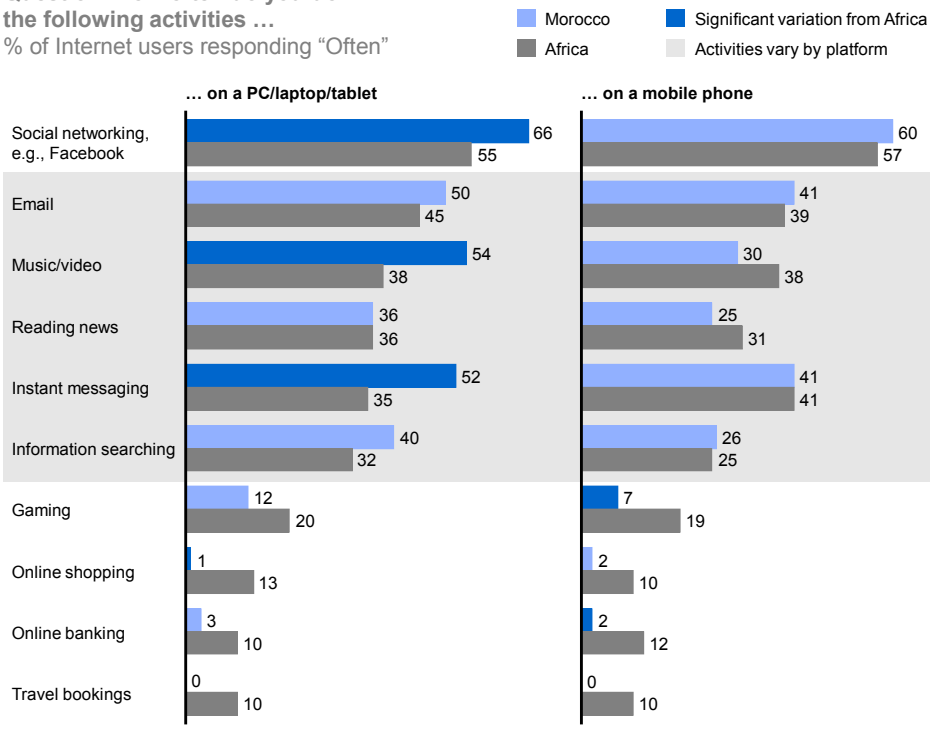
52
are online

54
have Internet-capable mobile phones

25
have smartphones

SOURCE: World Economic Forum; McKinsey Africa Consumer Insights Center survey, 2012; Internet World Stats; McKinsey Global Institute analysis

Exhibit 25
Morocco's urban Internet usage profile
Question: How often do you do the following activities …
% of Internet users responding "Often"



SOURCE: McKinsey Africa Consumer Insights Center survey, 2012; McKinsey Global Institute analysis

39 *Analyse de l'evolution des marches du fixe, du mobile et de l'Internet,* Agence Nationale de Réglementation des Télécommunications (ANRT), March 2013.

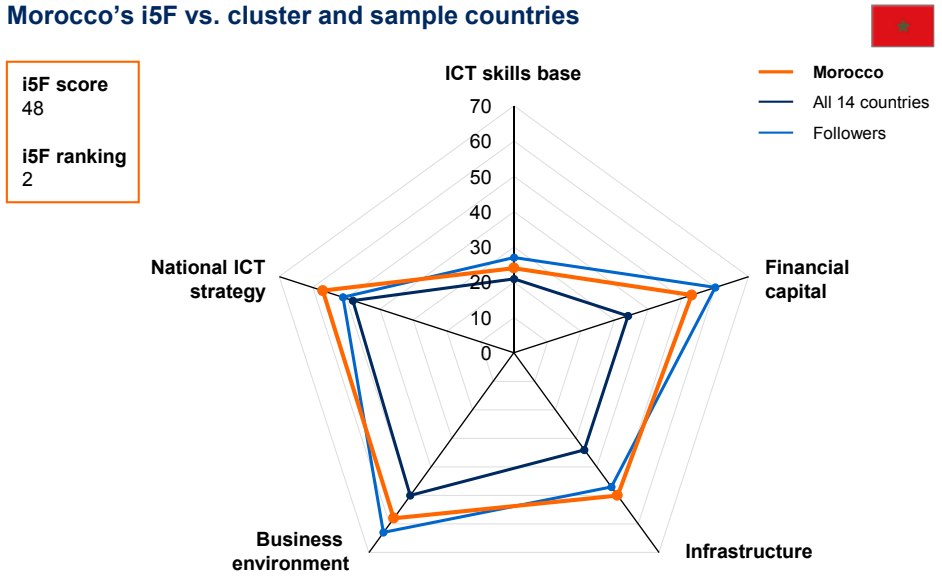
Private-sector investment in Internet-related technologies accounts for 12 percent of iGDP, which translates to $8.30 per capita, again the highest in the sample. Private investment is mainly driven by the banking sector and business process outsourcing by multinationals. Corporate Morocco is just beginning to leverage the Internet for productivity gains. Internet penetration in formal companies is already high, and some studies have shown that it could reach 80 to 90 percent.[40]

Morocco has a positive trade balance, which contributes 40 percent of iGDP. This is driven by its successful BPO industry, which has created 60,000 jobs and resulted in export revenue of $1 billion.

Morocco has relatively strong Internet foundations. Its i5F score is 48 percent, second only to South Africa in the sample of 14 countries. However, like all African countries, it will need to develop a workforce with the right skills to support its growing ICT sector, including scientists and engineers (Exhibit 26). Morocco will also need to invest in infrastructure, particularly in less-populated rural areas, as it works to implement of its national strategy.

Exhibit 26

Morocco's i5F vs. cluster and sample countries



SOURCE: McKinsey Global Institute analysis

South Africa

South Africa is the largest and most advanced economy in Africa. With a GDP of $380 billion, it is a middle-income emerging market with an abundant supply of natural resources. Its economy has well-developed financial, legal, communications, energy, and transport sectors as well as a modern infrastructure.

South Africa has around 4.2 million fixed-line connections, which are provided by Telkom and Neotel. Mobile phone ownership increased from 17 percent of adults in 2000 to become virtually universal in 2012.

40 *Online and upcoming: The Internet's impact in aspiring countries,* McKinsey & Company High Tech Practice, January 2012.

Internet usage has increased along with mobile phones and smartphones. By mid-2012, an estimated 8.5 million South Africans were Internet users (Exhibit 27), and Internet penetration has been accelerating even more rapidly in the past year. Most users rely on mobile Internet. In 2011 there were just 820,000 ADSL subscribers, compared with some 5.5 million 3G users in South Africa.[41] And there is room for continued growth: in urban areas, just 54 percent of consumers are online, compared with 78 percent in Kenya and 70 percent in Senegal.

South Africa's urban Internet users go online for social networking, instant messaging, and email, using mobile phones more frequently than PCs or laptops (Exhibit 28).

South Africa is one of the leaders in terms of Internet use by companies. Large businesses and institutions in South Africa have already started positioning themselves to fully exploit the Internet to reduce costs and increase sales by improving service and reaching new customers. Tertiary education, the airline industry, and the banking sector, to give just a few examples, now utilise the Internet as an integral part of their operations. South African universities offer end-to-end online applications and query resolutions, allowing students and prospective students to interact entirely via the Web. The University of South Africa (UNISA), for example, has even closed its student-facing call centres and now connects with students entirely through the Internet and messaging. The airline industry has fully embraced online check-in and e-ticketing. Banks have experienced exponential growth in online transactions.

South African companies are also making growing use of social media. Some 95 percent of major brands have some form of social media strategy aimed at consumers, and more than one-third are already using, or intend to use, specialist social media agencies to assist in their public relations, marketing, and branding.

We estimate South Africa's iGDP at $5.2 billion, which is 1.4 percent of total GDP.[42] This is the highest in Africa in absolute terms, but as a percentage of GDP, it is below that of most aspiring countries.

Private consumption accounts for 65 percent of iGDP. Mobile Internet is the biggest component (accounting for 35 percent of private consumption), followed by broadband revenue (32 percent), computer sales (13 percent), e-commerce (12 percent), and smartphone sales (8 percent).

Although urban South Africans are starting to shop online, e-commerce remains limited. Online retail accounts for less than 0.5 percent of total retail spending. One reason for this hesitation is a lack of trust in the security of online payments. To counter this, retailers and banks have worked together to improve the security of online transactions and to educate customers about avoiding online fraud. The launch and promotion of solutions like PayPal and EasyPay have gone a long way toward making South Africans feel secure making payments online. In addition, South Africa has the highest number of secure Internet servers in the sample countries.

41 World Wide Worx.

42 Other estimates suggest that iGDP for South Africa could be as high as 2 percent and growing at 0.1 percent annually. See *Internet matters: The quiet engine of the South African economy,* World Wide Worx report commissioned by Google, 2012.

Private-sector investment in Internet-related technologies accounts for 5 percent of iGDP, which translates to $5.20 per capita, the third-highest level in our sample (after Morocco and Egypt). Much of this is driven by major infrastructure investments by large telecom operators, including the build-out of fibre networks.

Exhibit 27

South Africa's Internet penetration in 2012

$5.2 billion
South Africa's iGDP, which is 1.4% of total GDP

8.5 million
Internet users

135%
mobile penetration

2%
have fixed-line broadband at home

33%
use mobile broadband

20%
have access to a PC

6.3 million
Facebook users

For every 100 urban South Africans …

54
are online

63
have Internet-capable mobile devices

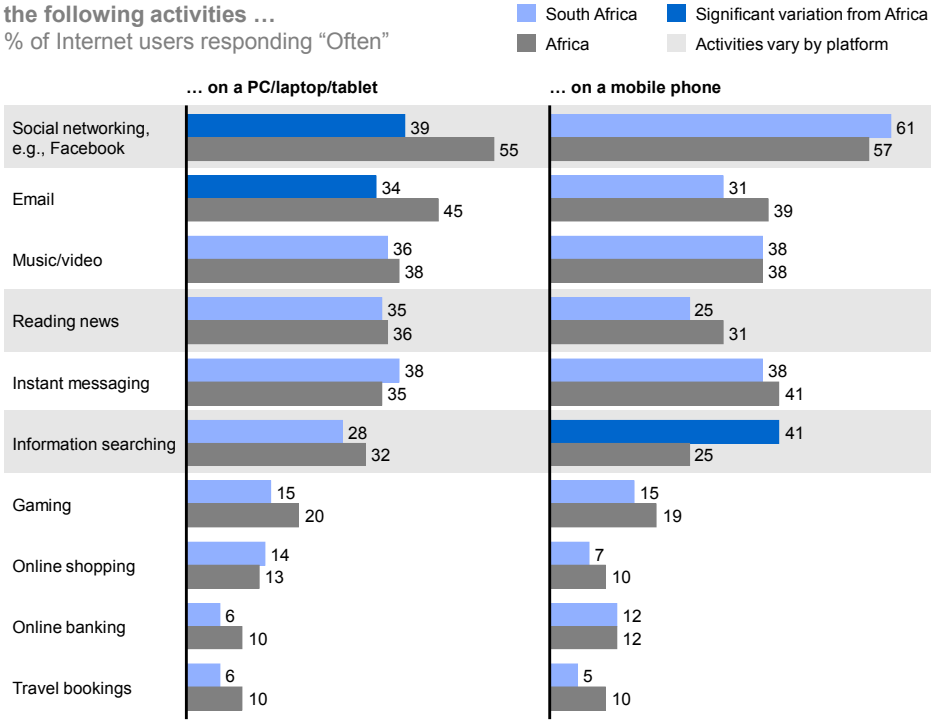
21
have smartphones

SOURCE: World Economic Forum; McKinsey Africa Consumer Insights Center survey, 2012; Internet World Stats; McKinsey Global Institute analysis

Exhibit 28

South Africa's urban Internet usage profile

Question: How often do you do the following activities …
% of Internet users responding "Often"



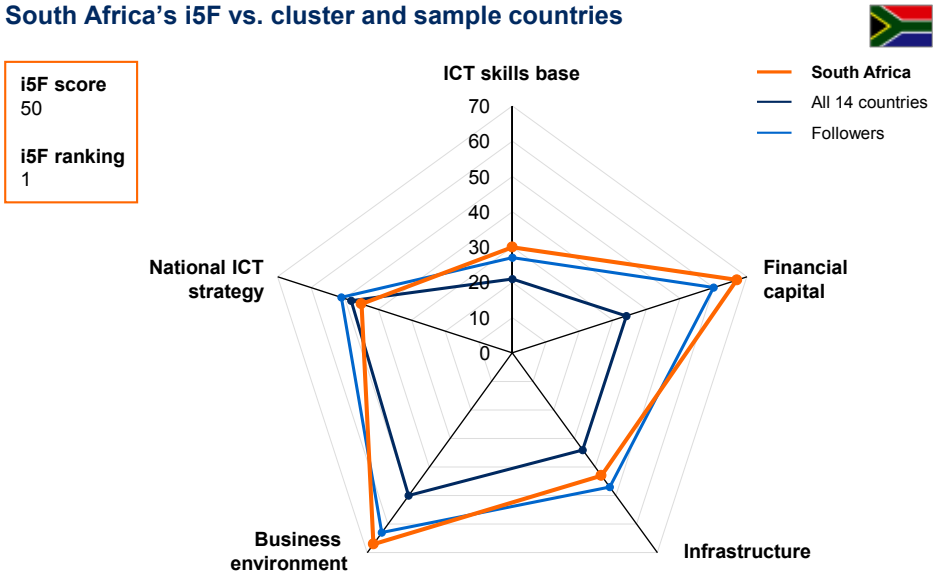
SOURCE: McKinsey Africa Consumer Insights Center survey, 2012; McKinsey Global Institute analysis

Public expenditure contributes 6 percent of iGDP, which translates to $6 per capita, the second highest in our sample after Morocco. The government has had some notable successes in rolling out e-government programmes. Tax filing went from fully manual in 2006 to more than 99 percent of returns filed electronically in 2011, for example, and the "e-NaTiS" programme has shifted car registration, driver's licenses, and traffic news online, as well as creating a national vehicle database to combat theft.

South Africa is one of the three countries in the sample with a positive trade balance—one that contributes 24 percent to iGDP. The country has successfully developed a business process outsourcing industry that today generates $1.5 billion in export revenue and has created 54,000 direct jobs. In addition, there is potential to expand local manufacturing of Internet-capable devices. In 2013, Seemahale Telecoms announced the launch of locally designed, developed, and manufactured Android smartphones and tablets.

South Africa has the highest overall i5F score among our sample (50 percent), thanks in large part to the availability of capital and its business environment (Exhibit 29). To realise its full potential, however, South Africa will need to keep building its Internet foundations, with particular focus on developing human capital and continuing to invest in improving last-mile connectivity, download speeds, and rural access. While the government has identified ICT as a priority, it can help to accelerate growth in the sector by developing a more actionable ICT strategy and national broadband plan.

Exhibit 29
South Africa's i5F vs. cluster and sample countries



SOURCE: McKinsey Global Institute analysis

EMERGING: CAMEROON, CÔTE D'IVOIRE, EGYPT, GHANA, MOZAMBIQUE, AND TANZANIA

Apart from Mozambique (1.6 percent), these countries post iGDPs of 1.3 percent or lower, the vast majority of which is driven by private consumption. Egypt's iGDP composition is an exception to this; it stands out in terms of private investment and public expenditure in dollar per capita terms (although there is room to increase both as a percentage of GDP). All of these countries, including Egypt, could do well to drive public expenditure and attract private investment. Overall, these countries currently have weak foundations for Internet growth, raising the question of whether they could change this picture through more concerted government action that builds on the relative strength of their business environments.

Cameroon

Cameroon is Africa's 13th-largest economy, with a nominal GDP of $26 billion and an economic growth rate of 4.7 percent in 2011. Exports of petroleum, cocoa, coffee, and other commodities are the biggest contributors.

Cameroon has one of the highest urbanisation rates in Africa (58 percent of its 20 million people live in cities), but almost half the country's population (slightly above the African average of 47 percent) still lives on less than $2 a day.

Estimates indicate that Cameroon's Internet penetration rate was approximately 5 percent in 2012. Mobile phones, meanwhile, have a penetration rate of 64 percent (Exhibit 30). Smartphone sales have been growing (an average of 3 percentage points over the past three years) and will likely surpass feature phone sales in 2013.

Exhibit 30
Cameroon's Internet penetration in 2012

$324 million
Cameroon's iGDP, which is 1.2% of total GDP

1 million
Internet users

7%
have access to a PC

560,000
Facebook users

64%
mobile penetration

SOURCE: World Economic Forum; McKinsey Africa Consumer Insights Center survey, 2012; Internet World Stats; McKinsey Global Institute analysis

Until 2012, there were two mobile operators, Orange and MTN, offering 2G services. However, a third player, Viettel, entered the market in December 2012 and aims to roll out 3G infrastructure in 2014.

Among the biggest bottlenecks in Cameroon's digital development are the cost of access and the quality of connection and infrastructure. Because of limited bandwidth, Internet prices are high by regional standards and Cameroon still has one of the slower download speeds in Africa. But despite these barriers, some innovations are springing up. Orange Money is offering mobile phone owners new payment solutions in partnership with the bank BICEC, for example. Users can make deposits, withdrawals, and transfers, as well as pay for items and Orange top-ups in certain shops. As of February 2013, the service had more than 700,000 users in the country. In the health-care arena, a "telecardiology" centre is being piloted in Yaoundé to handle basic cardiology procedures with a dedicated medical tablet PC called Cardiopad. If successful, the tablet will be produced at industrial scale and commercialised at a country level.

Cameroon's iGDP totals $324 million, or 1.2 percent of total GDP, placing it in the middle group of African countries. Private consumption accounts for the overwhelming majority of this (96 percent), with 87 percent of that from computer sales, 7 percent from smartphone sales, and 5 percent from mobile Internet. E-commerce activity is virtually nonexistent. Given the extremely low rates of PC and Internet penetration, the e-commerce business case remains difficult. In addition, few consumers have access to online payments.

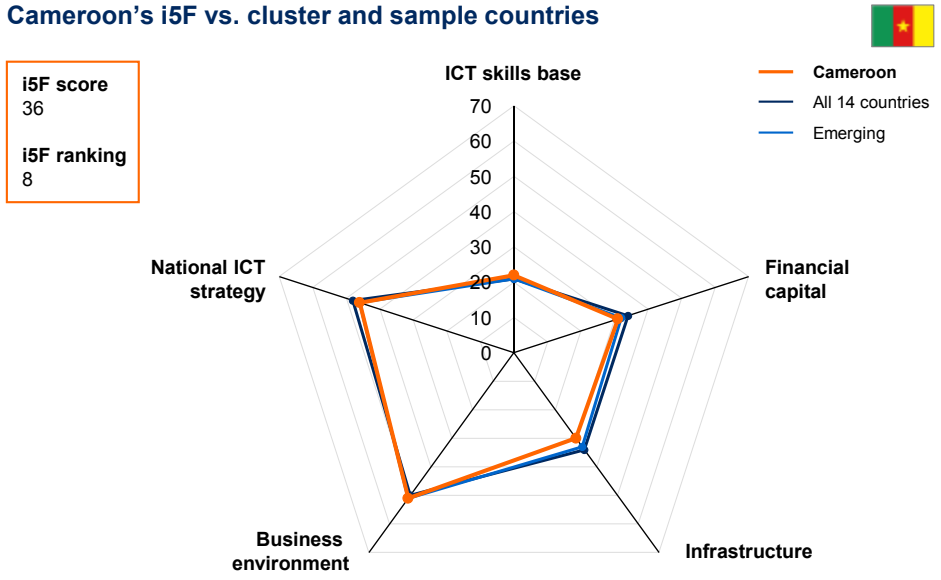
Public expenditure currently accounts for only 2 percent of iGDP, or $0.30 per capita—far below the average peer level of 13 percent. There is great scope to improve this by moving additional government services online. According to the World Economic Forum, Cameroon scores only 1.5 on a scale of 1 to 10 for the level of government e-services.

Private-sector investment accounts for only 2 percent of iGDP, or $0.40 per capita, again much lower than the peer average. Cameroon has few secure Internet servers (1.04 per million people).

Cameroon does have the potential to grow its iGDP if it can build on the strength of its large, untapped market of young people. Its i5F score is relatively low at 36 percent (Exhibit 31). Cameroon's strengths are in government prioritisation and business environment, while improvement is needed on the dimensions of access to financial capital, infrastructure, and human capital. The entry of Viettel as a third operator and the imminent rollout of 3G services will improve infrastructure provision. But further reforms, such as opening access to the submarine fibre-optic cable, could accelerate progress. The public and private sectors will need to work together to improve infrastructure provision and take concerted action to address the nation's current shortage of technology skills.

Exhibit 31

Cameroon's i5F vs. cluster and sample countries



SOURCE: McKinsey Global Institute analysis

Côte d'Ivoire

The 14th-largest economy in Africa, Côte d'Ivoire posted GDP of $25 billion in 2012. Agricultural exports (notably world-class cocoa as well as coffee and palm) are key drivers of the economy. Despite Côte d'Ivoire's recent swing back to positive growth, the United Nations Capital Development Fund estimates that its civil war drove poverty rates from approximately 39 percent to almost 50 percent nationally, with rates as high as 63 percent in rural communities.

Internet usage is not yet widespread in Côte d'Ivoire. Household PC penetration stands at only 2 percent (Exhibit 32). Mobile broadband revenue is growing at about 155 percent per year, highlighting the growing penetration of more sophisticated mobile devices and the importance of data.

Côte d'Ivoire's iGDP is estimated to be $324 million, or 1.3 percent of GDP. Private consumption accounts for 98 percent of its iGDP. The fact that hardware sales still exceed broadband revenue indicates that the ICT sector is still in its early phase of development.

ICT entrepreneurs find it difficult to establish viable businesses. In 2010, it cost some 130 percent of an average Ivorian entrepreneur's annual income to start a business. It is also a complex process: it takes up to 32 days to start a business in Côte d'Ivoire (compared with 12 days in Morocco and Ghana and seven days in Egypt).[43]

43 *Ease of doing business index 2012*, World Bank, 2011.

Private-sector investment in Internet-related technologies accounts for only 1.5 percent of iGDP in Côte d'Ivoire, compared with an average of 7 percent across the sample countries. This translates to $0.20 per capita, indicating that there is significant room for growth. Côte d'Ivoire issued its first 3G license (to MTN) in 2011. Coverage began in Abidjan, and as of 2013, it had grown to 16 cities countrywide. The top three providers now have 3G service enabled.

Exhibit 32
Côte d'Ivoire's Internet penetration in 2012

$324 million
Côte d'Ivoire's iGDP, which is 1.3% of total GDP

968,000
Internet users

96%
mobile penetration

2%
have access to a PC

SOURCE: World Economic Forum; McKinsey Africa Consumer Insights Center survey, 2012; Internet World Stats; McKinsey Global Institute analysis

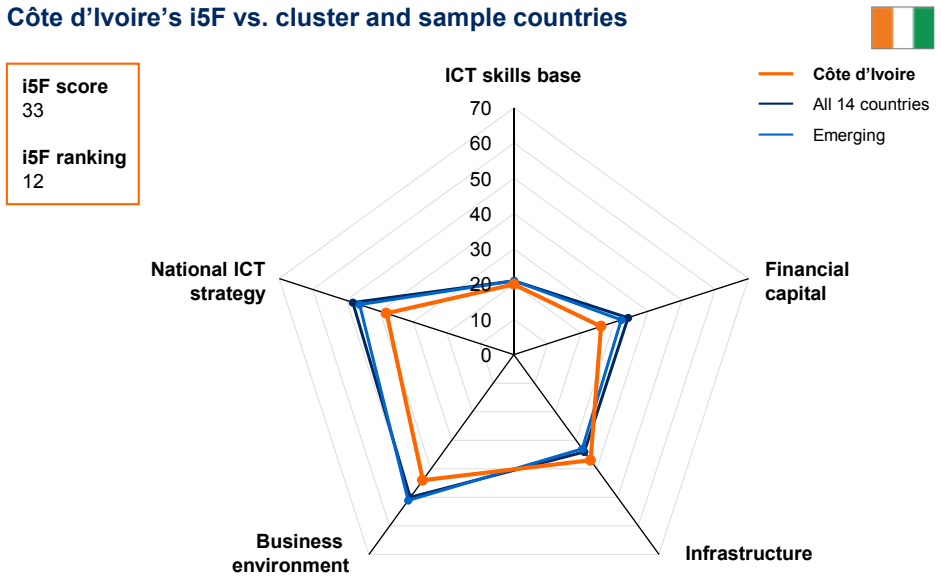
Orange Money, an Orange Mobile initiative in partnership with the bank BICICI and technology partner Comviva, offers domestic money transfers, utility payments, airtime top-ups, and merchant payments. It is currently estimated that the service handles more than $2 million in transactions. In health care, OrangeSMS offers a toll-free number that helps users in major cities find the nearest open pharmacy, which may offer services more readily than a specialist practitioner.

Public expenditure accounts for 1.3 percent of iGDP, or $0.20 per capita.

At 33 percent, Côte d'Ivoire's i5F score indicates gaps across all five Internet foundations (Exhibit 33). However, the most critical issues are improving the supporting infrastructure, such as mobile base stations and electricity supply, and creating a more favourable business environment. High collateral requirements, complex credit application procedures, and limited credit history data all restrict access to capital. As these foundations are put into place, Côte d'Ivoire will also need to pay attention to human capital development. While the nation's education system has historically been relatively effective, conflict and political instability since 2011 have caused setbacks, including lengthy university closures. Lack of funding is another hurdle. The key question for Côte d'Ivoire is whether the government could accelerate the development of the ICT sector through a more coordinated ICT strategy that builds the other Internet foundations.

Exhibit 33

Côte d'Ivoire's i5F vs. cluster and sample countries



SOURCE: McKinsey Global Institute analysis

Egypt

Egypt is Africa's third-largest economy, with a GDP of $254 billion and large service and industrial sectors. From 2004 to 2011, it enjoyed steady economic growth of more than 5 percent annually, mainly driven by tourism, foreign direct investment in business process and IT outsourcing, and hydrocarbons. But the country's recent political upheaval has created a difficult environment for economic growth. Contributing to public discontent is the fact that unemployment stands at 12.5 percent and 20 percent of Egyptians struggle to survive on less than $2 a day.

Since 1998, Egypt has embarked on reforms to liberalise its telecommunications services and allow more competition. The sector grew to reach $5.7 billion in 2012.

Egypt's Internet penetration rate (Exhibit 34) of 35.6 percent stands well above Africa's average (about 16 percent), but still lags behind Morocco. Internet penetration in urban areas (at 46 percent) is not much higher than the national average and lags behind the rest of the sample countries. However, it is widespread among all generations—in fact, Egypt is one of the rare African countries in which the 55-plus age group goes online (at a 20 percent rate). Paradoxically, Egypt lags behind peer countries in Internet usage among ages 16 to 24.

PC ownership is high, at 43 percent in urban areas, and represents the dominant form of access, even though 40 percent of the urban population owns Internet-capable phones. Social networking, email, and reading the news are the key reasons for going online, while online shopping, banking, and travel bookings have been slow to catch on (Exhibit 35).

Exhibit 34
Egypt's Internet penetration in 2012

$2.5 billion
Egypt's iGDP, which is 1.0% of total GDP

29.8 million
Internet users

40%
have access to a PC

12.2 million
Facebook users

For every 100 urban Egyptians …

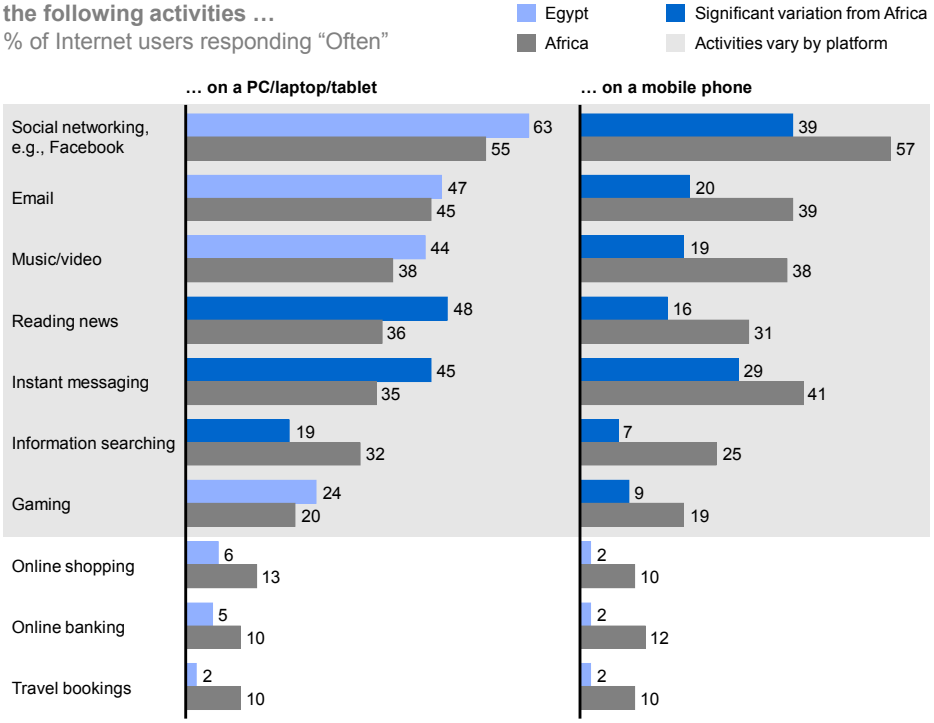
46
are online

40
have Internet-capable mobile phones

10
have smartphones

SOURCE: World Economic Forum; McKinsey Africa Consumer Insights Center survey, 2012; Internet World Stats; McKinsey Global Institute analysis

Exhibit 35
Egypt's urban Internet usage profile
Question: How often do you do the following activities …
% of Internet users responding "Often"



SOURCE: McKinsey Africa Consumer Insights Center survey, 2012; McKinsey Global Institute analysis

Egypt's iGDP is $2.5 billion—but that is only 1.0 percent of its annual GDP, even though Egypt is one of the leaders in the sample for fixed-line infrastructure. While private consumption is the overwhelming driver of iGDP in the other countries in our sample, private investment and public expenditure play bigger roles in Egypt. Private consumption does account for almost two-thirds of iGDP, with 81 percent going to computer and smartphone sales, 11 percent to broadband access revenue, and 8 percent to e-commerce. There are a number of local startups and international players launching e-commerce in Egypt. These include souq.com, nefsak, and markaVIP (an exclusive, invitation-only fashion site). There are also alternative payment options (payment gateways and pre-paid accounts) to compensate for the low penetration of banking and credit cards. Since the loosening of regulations, all three mobile network operators have begun to offer mobile banking services that should support e-commerce transactions.

Egypt's public expenditure on Internet-related products, services, and programmes is 18 percent of iGDP, placing it second in our sample behind Nigeria.[44] This translates to $5.40 per capita, behind only Morocco and South Africa. The new government announced a Digital Socio-Economic Strategy in June 2013 to reinvigorate its engagement in Internet-related investment and upgrade broadband infrastructure.

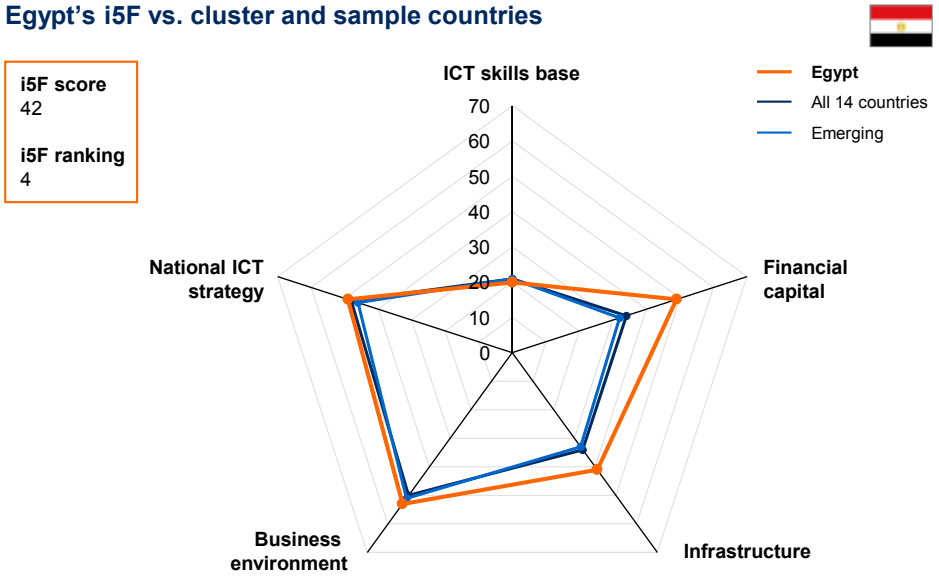
Private-sector investment in Internet-related technologies accounts for 23 percent of iGDP, the highest share in the sample. With only 13 percent of small businesses and 41 percent of medium-sized enterprises online, however, there is ample room for growth. The Digital Socio-Economic Strategy aims to leverage Egypt's unique geographic position to attract companies and increase private-sector investment in electronic design and manufacturing, information infrastructure and digital content, cyber-security, research centres, cloud computing farms, and similar ventures.

To foster private consumption, the government plans to support local manufacturing of technology products at a competitive price for Egyptians. The goal is to invest $2 billion toward producing 20 million tablets by 2017, beginning in 2013 with a pilot with Benha Electronics. If this effort is successful, it could improve Egypt's Internet-related trade balance, which actually shaves 2.5 percent off iGDP, as the country currently relies on imported technology and services.

Egypt fares relatively well on a number of the i5F Internet foundations, with an overall score of 42 percent (Exhibit 36). This places it fourth in the sample, behind South Africa, Morocco, and Kenya. It performs relatively well on most dimensions but will need to invest in developing human capital and high-tech skills to realise its ICT vision. Initiatives by IBM to offer IT courses are a start, but the problem will have to be tackled on a wider scale. Egypt's most immediate hurdle, however, is the need for social and political stability as a necessary condition for growth. A stable Egypt could bring back, if not increase, ICT-related foreign direct investment.

44 This assumes that the expense mix of government, health care, and education has remained stable in the past two years.

Exhibit 36
Egypt's i5F vs. cluster and sample countries



SOURCE: McKinsey Global Institute analysis

Ghana

With cocoa and gold as its backbone industries, Ghana is also the continent's newest oil producer, with an estimated 700 million barrels in reserves. Although it is one of Africa's fastest-growing economies, with a GDP of $37 billion, Ghana faces formidable challenges. In the capital city of Accra, for instance, 42 percent of the population still lives in informal settlements with no access to electricity or other basic services.

Mobile broadband is on the rise in Ghana. Urban Internet penetration is estimated to be 55 percent, while a quarter of city residents log onto the Internet daily, the second-highest rate in Africa (Exhibit 37). Ghanaians are heavy users of social networking, email, and instant messaging (Exhibit 38).

Ghana's iGDP is $420 million, which is 1.1 percent of its annual GDP. Private consumption accounts for 86 percent of iGDP, and in a sign of a maturing ICT industry, broadband revenue exceeds purchases of hardware. E-commerce revenue is negligible, however, and provides an opportunity for growth. E-commerce is currently constrained by the lack of online payment solutions; Ghana is largely a cash-based economy, and only 30 percent of the population has access to formal banking services. Cyber-crime is another constraint to e-commerce, making Ghanaians hesitant to conduct transactions online. Ghana has become well-known for the prevalence of Internet fraud, which is popularly termed "sakawa". It is estimated that there are 150,000 fraudulent transactions per day, and that in 2011 there was a 400 percent increase in mobile fraud.

Public expenditure is $0.90 per capita, accounting for 6 percent of iGDP (versus 8 percent average for the sample, which indicates significant room for growth). The government is committed to delivering essential services online. In 2012, it launched an e-services pilot covering 11 ministries, agencies, and departments.

More expenditure is expected in the next phase to create 100 more portals by 2015. The national ICT for Accelerated Development (ICT4AD) vision is aimed at modernising the economy and society using technology as the main catalyst. On the social front, Ghana has plans to distribute laptops more widely in schools and universities.

Exhibit 37

Ghana's Internet penetration in 2012

$420 million
Ghana's iGDP, which is 1.1% of total GDP

3.5 million
Internet users

100%
mobile penetration

12%
have access to a PC

1.6 million
Facebook accounts

For every 100 urban Ghanaians …

55
are online

53
Have Internet-capable mobile phones

21
have smartphones

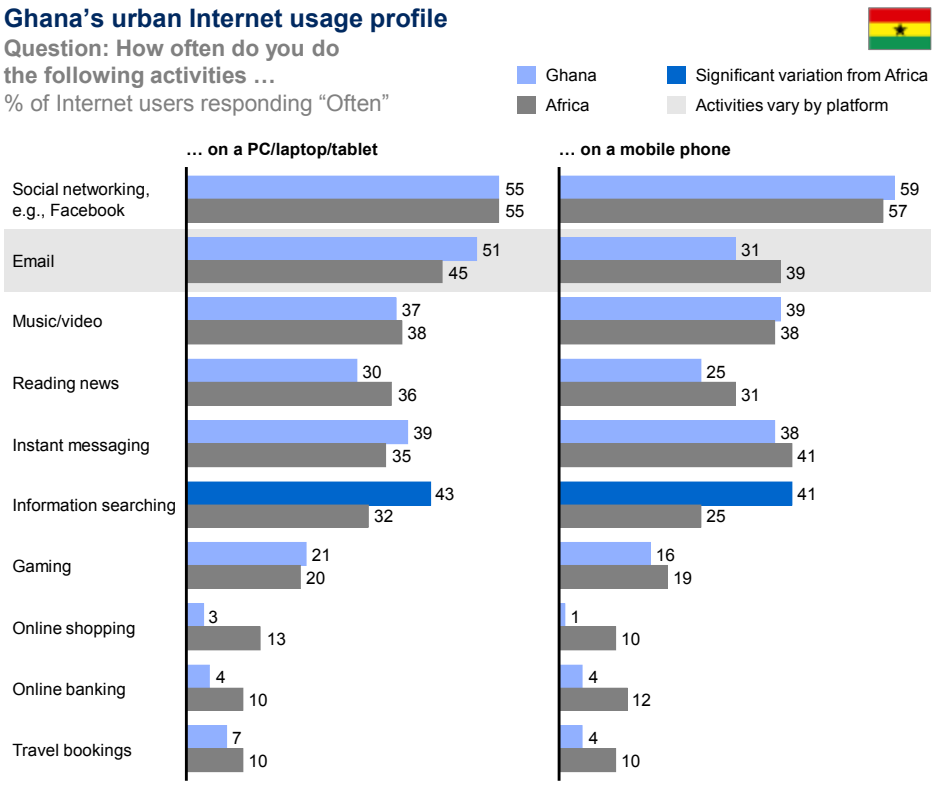
SOURCE: World Economic Forum; McKinsey Africa Consumer Insights Center survey, 2012; Internet World Stats; McKinsey Global Institute analysis

Exhibit 38

Ghana's urban Internet usage profile

Question: How often do you do the following activities …

% of Internet users responding "Often"



SOURCE: McKinsey Africa Consumer Insights Center survey, 2012; McKinsey Global Institute analysis

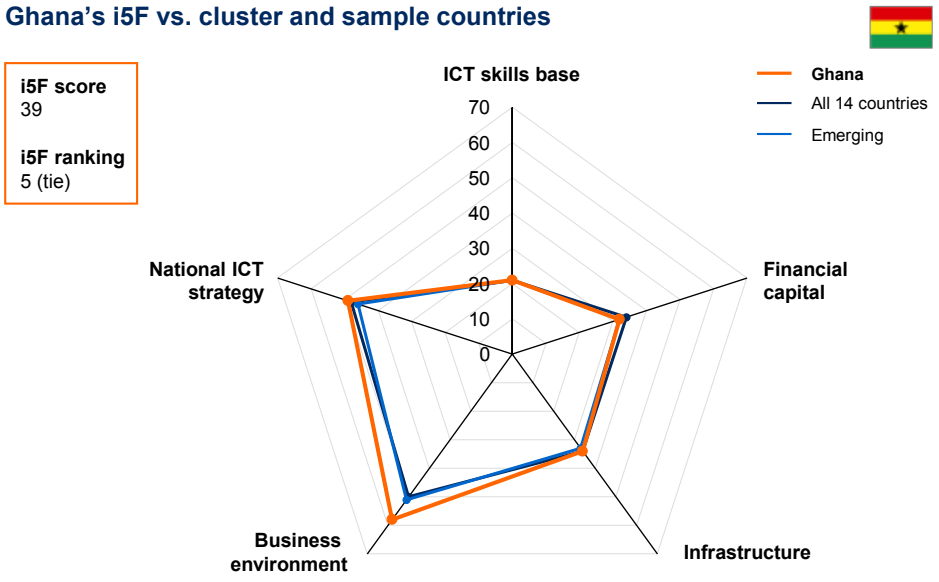
Private-sector investment in Internet-related technologies accounts for 11 percent of iGDP, translating into $1.80 per capita. There are new developments from the private sector, notably in financial services. In partnership with nine banks, telecom operator MTN Ghana launched MTN Mobile Money, a service that will allow Ghanaians to perform a range of basic financial transactions (such as money transfers, purchases, and bill payment) via their handsets without the need for a bank account. It has also launched KwikAdvance, a credit service that allows MTN Mobile Money subscribers to access up to 40 percent of their salary before payday.

MTN Ghana has also partnered with Hollard Insurance, MicroEnsure, and MFS Africa to offer mi-Life Insurance, an innovative mobile money insurance product designed specifically for low-income clients.

Ghana has, over the past decade, relaxed the ICT regulatory environment and pursued policies to accelerate the sector's growth. It is one of the few African countries posting simultaneous growth in mobile and fixed-line subscriptions—and both markets are characterised by competition for subscribers, which has precipitated a wave of new investment to improve the quality of connection and coverage. In 2011, capital expenditure by mobile telecoms exceeded $600 million.

With an i5F score of 39 percent, Ghana compares relatively well to the other sample countries (Exhibit 39). But there remains substantial room for improvement, especially in terms of rural access and the number of secure Internet servers. The World Economic Forum has also highlighted the lack of local digital content and poor ICT infrastructure as barriers.[45]

Exhibit 39
Ghana's i5F vs. cluster and sample countries



SOURCE: McKinsey Global Institute analysis

45 *The global information technology report 2013: Growth and jobs in a hyperconnected world,* World Economic Forum and INSEAD, 2013.

Mozambique

With a GDP of $13.5 billion, Mozambique is one of the smallest economies in Southern Africa, although it is likely to enjoy growth in the coming years due to its natural gas resources.

In the telecom sector, government-owned Telecomunicações de Moçambique (TDM) is the only fixed-line operator in the country, with about 88,000 subscribers. The government has opened the fixed-line market to competition, but there has been little interest. Three mobile operators (MCell, Vodacom, and Movitel) share ten million active mobile subscribers.

Internet usage in Mozambique is low, with only 4.3 percent of the population online (Exhibit 40). While 30 percent of urban households have access to a PC, Mozambique has only 17,500 fixed-line broadband subscriptions, equivalent to a household penetration rate of just 0.4 percent. The introduction of two submarine cables in 2009 and 2010 gave the country access to cheaper international connectivity and reduced its reliance on VSAT or South Africa for Internet transition services. But access costs are the highest among our sample countries, and remain out of reach for all but the most affluent segments of the population.

Even though Mozambique's Internet users are rarely profiled due to their small numbers, more than one-third of them are on Facebook. However, slow Internet speeds make it very difficult to access content beyond text.

Exhibit 40
Mozambique's Internet penetration in 2012

$220 million
Mozambique's iGDP, which is 1.6% of total GDP

1 million
Internet users

360,000
Facebook users

33%
mobile penetration

6%
have access to a PC

SOURCE: World Economic Forum; McKinsey Africa Consumer Insights Center survey, 2012; Internet World Stats; McKinsey Global Institute analysis

Mozambique's iGDP is estimated at $220 million, or 1.6 percent of GDP—and while this iGDP appears relatively high compared to other African countries, it is low in absolute terms. It is dominated by private consumption, which accounts for 99 percent of iGDP. Most of this is driven by hardware sales of PCs and phones. Online commerce is developing, but some sites are targeted mainly towards the expatriate population. The sites that allow for online ordering, payment, and delivery have prices denominated in US dollars or euros, and payment is by international cards. Other sites allow online ordering, but customers have to pay cash on delivery or when picking up their orders.

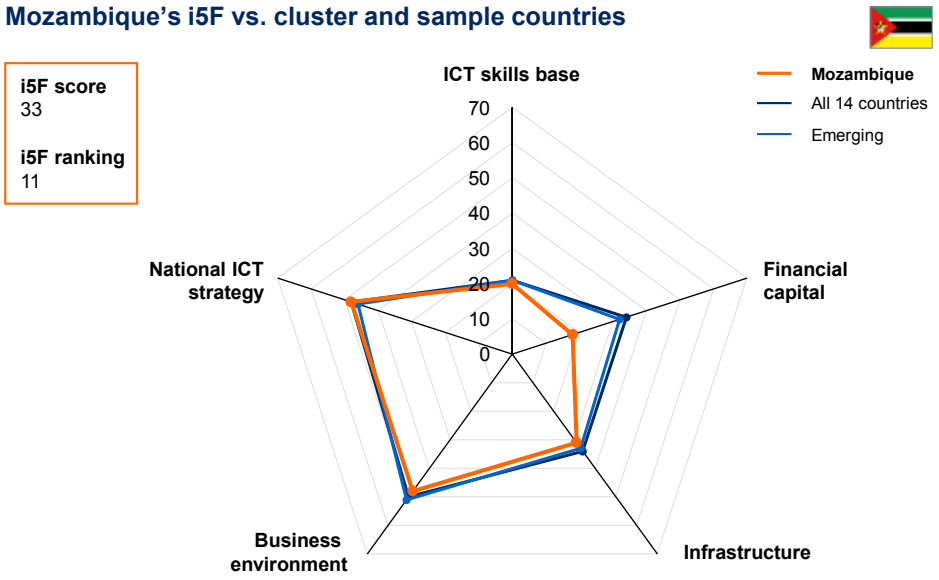
MCell launched a mobile money solution called Mkesh that was marketed as the solution that could bring the bank to everybody's pocket. However, this did not resonate with the general population, as banking penetration is low and those who do have bank accounts withdraw their salary on payday. Vodacom has launched a second mobile money solution, M-Pesa, and hopes to draw on the lessons learned from its success in Kenya. It is investing in customer education as well as advertising, focusing on improving the public's trust in electronic value over cash. Customers are being made aware of the dangers of carrying large sums of money and the benefits of storing that value electronically.

Private-sector investment in Internet-related technologies accounts for just 0.4 percent of iGDP, compared with the sample average of 7 percent. This translates to $0.03 per capita. Until recently, ICT investments were concentrated around Maputo, Beira, and other development zones.

Public expenditure contributes only 1.7 percent of iGDP, or $0.20 per capita. Government use of the Internet remains very limited, with most websites used to provide simple information. But there is a focus on expanding the reach of the Internet, and the government has set up a fund to help telecom operators achieve this. It is also in the process of launching an e-tax system to enable online payment and improve compliance.

Mozambique has a relatively low i5F score of 33 percent. It matches the sample countries in terms of national ICT strategy and business environment but will need to build the other i5F foundations for Internet-driven growth (Exhibit 41). Today its potential is hampered by limited infrastructure and the lack of widely accepted online payment systems. Mozambique will need to attract investment in power, connectivity, and digitisation by the private sector, and to develop the necessary workforce skills.

Exhibit 41
Mozambique's i5F vs. cluster and sample countries



SOURCE: McKinsey Global Institute analysis

Tanzania

With a GDP of just over $31 billion, Tanzania is projected to grow at approximately 7 percent in the medium term, with inflation declining to single digits.[46] This, combined with continued emphasis on sound economic management, strengthened political governance, and newfound natural gas resources, puts Tanzania on a path for continued progress in development.

The Tanzanian telecom sector was liberalised in 1995 to introduce competition to MIC Tanzania, which now operates under the brand name Tigo. The main mobile operators are Zantel, Vodacom, and Airtel.

Mobile penetration in Tanzania currently stands at 60 percent, but Internet penetration is only around 12 percent (Exhibit 42). Just 4 percent of Tanzanians have access to PCs, and fixed-line connections to homes are almost nonexistent. A significant portion of users rely on Internet cafés to print and send documents, but the growing popularity of affordable smartphones is moving people away from accessing the Internet via PC.

Exhibit 42
Tanzania's Internet penetration in 2012

$403 million
Tanzania's iGDP, which is 1.3% of total GDP

5.6 million
Internet users

57%
mobile penetration

700,000
Facebook users

4%
have access to a PC

SOURCE: World Economic Forum; McKinsey Africa Consumer Insights Center survey, 2012; Internet World Stats; McKinsey Global Institute analysis

Tanzania's iGDP is $403 million, which is 1.3 percent of total GDP. This is in line with the African average of 1.1 percent but below the aspiring countries' average of 1.9 percent.

Private consumption accounts for 91 percent of iGDP, with approximately half driven by computer and smartphone sales and half by broadband revenue. Just 1 percent of iGDP is driven by e-commerce activity. Online shopping, banking, and travel bookings are emerging trends but are still minimal, due in part to low access to banking services and online payments. Another inhibitor to the development of e-commerce is the lack of a well-developed parcel delivery system; only 20 percent of households have formal physical addresses, and most people do not trust that goods paid for online will be delivered.[47]

46 *African economic outlook 2013,* African Development Bank, OECD Development Centre, UN Economic Commission for Africa, and UN Development Programme, 2013.

47 Universal postal union; expert interviews.

Mobile money, which has been instrumental in bridging the gap in financial inclusion in Kenya, is also taking off in Tanzania, which now has more mobile money accounts than bank accounts.

Private-sector investment in Internet-related technologies accounts for 6 percent of iGDP, compared to an average of 7 percent across the sample countries. As adoption increases, mobile providers are investing more in building their own networks. But corporate Tanzania has been very slow in adopting ICT as part of its operations. Most SMEs do not yet see a business case, given the cost of connectivity and unreliable power supply.

Public expenditure is 5.6 percent of iGDP, or $0.50 per capita. The government acknowledges the need to provide ICT access to all citizens, and possibilities for e-government initiatives to "deliver quality services to the public through technology", but is still in the early stages of implementing its strategy.[48] The government also recognises the potential for ICT to create gains in education and is already working to fund and train teachers in computer education. But most of the curriculum is still focused on the basics. The ultimate objective is to connect all schools, colleges, and universities and create new scientific research centres and modern public libraries.

Tanzania also has an Internet-related trade deficit that shaves 2.3 percent off total iGDP. But this could change as the country looks to invest in software development, pursue government initiatives to drive local content, and compete with neighbouring Kenya.

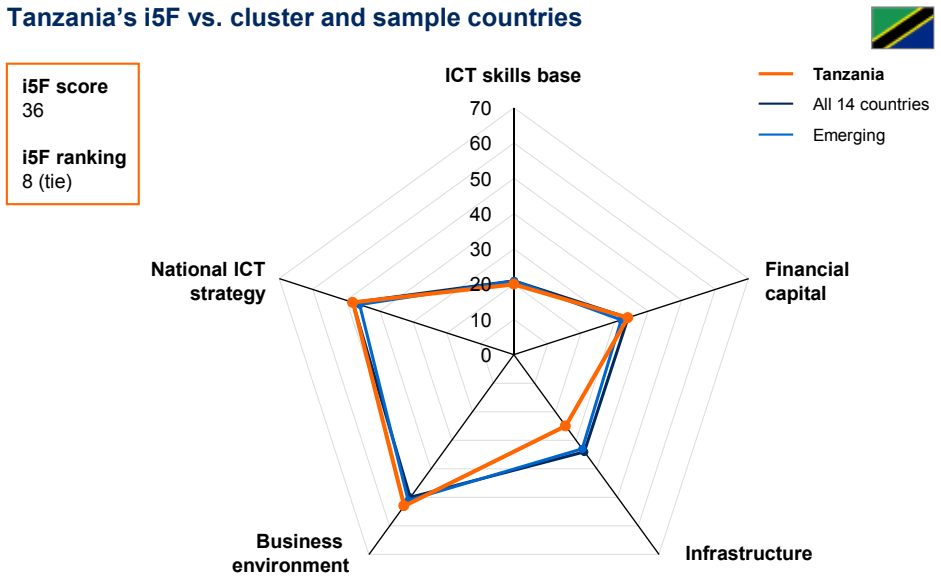
Tanzania can draw on its strong climate for entrepreneurship as a platform for the future growth of the ICT industry. But its i5F score is relatively low at 36 percent, with particular gaps in infrastructure, human capital, and the availability of financing (Exhibit 43). The biggest challenge remains power and telecommunications infrastructure, but some steps are being taken to address this. The National Information Communication and Technology Broadband Backbone (NICTBB) is being rolled out. It is a terrestrial continuation of the fibre-optic Eastern Africa Submarine Cable System (EASSy), which has already been made available to 16 regions since its activation in May 2010, leading to a sizeable drop in Internet capacity charges.[49] The NICTBB's objective is to deliver fast, efficient, and affordable data traffic to support a range of industries, including e-education, telemedicine, e-agriculture, e-commerce, and e-governance, even in the most remote parts of the country.

48 Tanzania e-Government Strategy, issued September 2012.

49 GlobalComms 2013 database, TeleGeography: PriMetrica.

Exhibit 43

Tanzania's i5F vs. cluster and sample countries



SOURCE: McKinsey Global Institute analysis

PUNCHING BELOW THEIR WEIGHT: ALGERIA, ANGOLA, ETHIOPIA, AND NIGERIA

In these countries, the Internet contributes less than 1 percent of GDP. However, the composition of iGDP is very different for Ethiopia, which is a pre-transition economy, and for Angola, Nigeria, and Algeria, which are resource-rich economies. In Ethiopia, private consumption accounts for 98 percent of iGDP, while in the other countries, private investment and public expenditure play a bigger role. Furthermore, if we adjust the GDP figures for Angola, Algeria, and Nigeria to account for the somewhat distorting factor of oil revenue, their iGDP would increase to 1 to 1.5 percent. The question for these countries would be how they could leverage resource revenue to build their ICT sector and harness the Internet to broaden economic development.

Algeria

A major energy exporter, Algeria posted GDP of $211 billion in 2012. The natural gas industry accounts for some 60 percent of the economy, with services contributing 30 percent and agriculture constituting 10 percent. Economic growth has averaged 2.6 percent over the past five years.

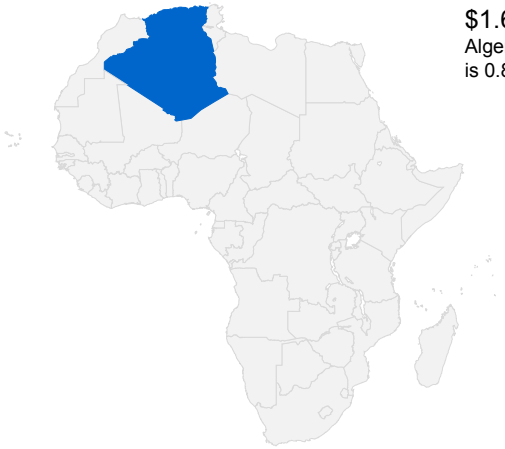
Like most resource-rich countries, Algeria faces the challenge of diversifying its economy—and developing the telecom sector to pave the way for Internet-driven growth can play a role in this process. Since August 2000, when the Algerian government opened the telecom and IT sector to private investment, major international players (such as Egypt's Orascom and Kuwait's Wataniya) have entered the market. The total revenue pool of telecom services reached $5.2 billion in 2011. Much of that growth is driven by mobile, which represents 60 percent of total revenue.

By 2012, 14 percent of Algerians were online, slightly below the African average of 16 percent (Exhibit 44). PCs are the device of choice, especially in Internet cafés. Mobile phones are not typically used for Internet access due to the lack of 3G coverage. However, the indicators point to sustained strong growth in the future,

as two-thirds of urban 16- to 24-year-olds use the Internet (the figure drops in older age brackets).

Internet penetration in urban areas is estimated at 52 percent. Urban residents tend to use the Internet for reading news, email, music, and social networking (Exhibit 45). Online shopping, banking, and travel bookings are still in their infancy. Internet users consider browsing speed to be the most important area for improvement. Providing local content in local languages could also drive Internet adoption.

Exhibit 44
Algeria's Internet penetration in 2012



$1.6 billion
Algeria's iGDP, which is 0.8% of total GDP

5.2 million
Internet users

103%
mobile penetration

4.1 million
Facebook users

25%
have access to a PC

For every 100 urban Algerians …

52
are online

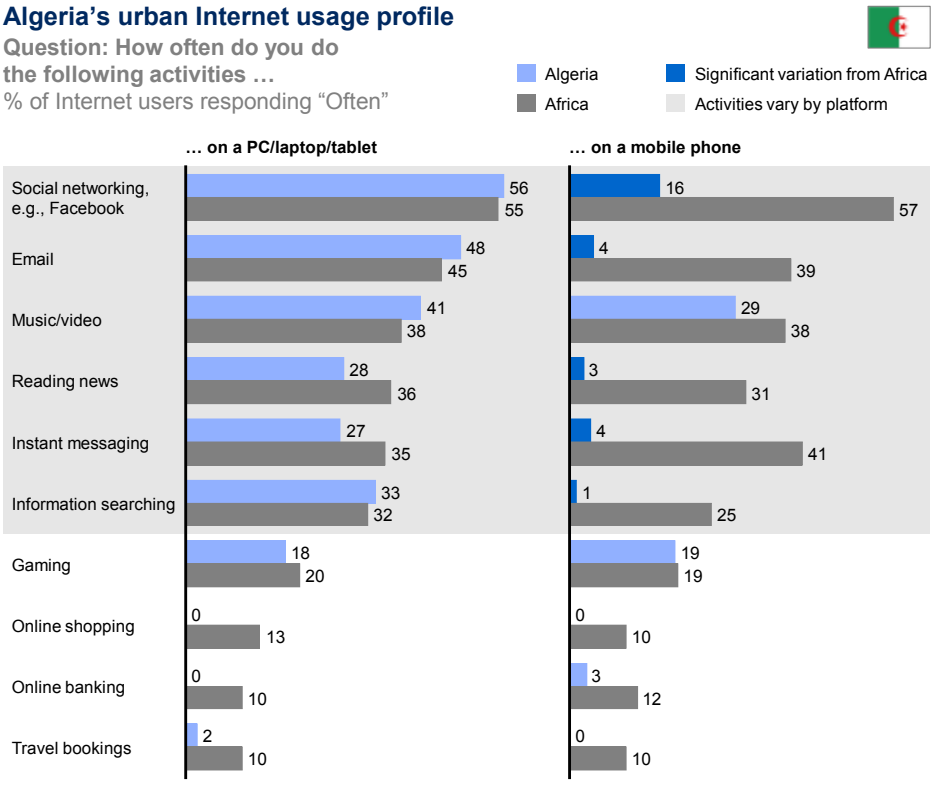
41
have Internet-capable mobile phones

27
have smartphones

SOURCE: World Economic Forum; McKinsey Africa Consumer Insights Center survey, 2012; Internet World Stats; McKinsey Global Institute analysis

Exhibit 45
Algeria's urban Internet usage profile

Question: How often do you do the following activities …
% of Internet users responding "Often"



SOURCE: McKinsey Africa Consumer Insights Center survey, 2012; McKinsey Global Institute analysis

At present, Algeria's iGDP is $1.6 billion—only 0.8 percent of the country's GDP. However, when adjusting GDP for oil revenue, Algeria's iGDP increases to 1.14 percent, in line with the average for the sampled countries.

Private consumption accounts for the vast majority of this (82 percent, which is in line with our other sample countries). Most private consumption consists of computer and smartphone sales, followed by broadband access revenue. There is little e-commerce activity due to the absence of online payments and national regulations. But there is consumer interest in online shopping, and a few startups have begun to emerge, including Tbeznyss.com, Guiddini.com, and Octave.biz. The Ministry of Post, Information Technology, and Communication announced the development of an e-commerce platform at the beginning of 2013, which could increase momentum.

Public expenditure, mostly consisting of hardware purchases, stands at 11 percent of Algeria's iGDP (or $4.80 per capita), while private-sector investment in Internet technologies accounts for 7 percent of iGDP (or $3.30 per capita). This is below leading emerging markets and developed countries but puts Algeria among the top five in our sample for both measures. Given Algeria's low iGDP, it raises the question of how to make both types of investment more effective in driving iGDP.

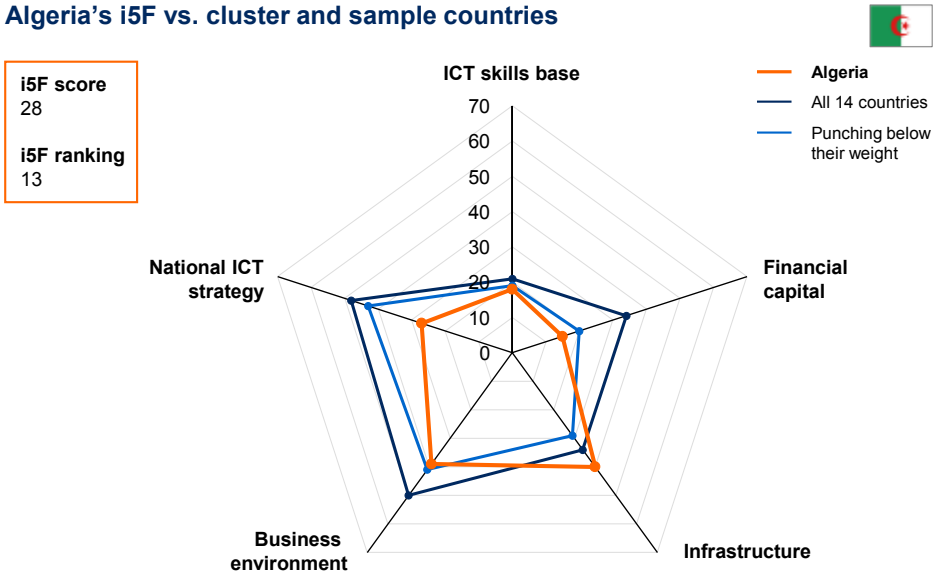
The country's Internet-related trade balance is roughly at equilibrium, with no exports and very low imports (due to local production of IT equipment).

The government's ambitious "e-Algeria 2013" programme sets some key goals, including an iGDP of 8 percent and the creation of 100,000 jobs. This strategy includes increasing ICT usage in public services, companies, and households; the upgrade of existing infrastructure and networks; the development of innovative knowledge-based businesses; and better regulation and improved international cooperation. To achieve the e-Algeria 2013 goals, the country will also need to strengthen its Internet foundations. Algeria currently scores 28 percent on the i5F index (Exhibit 46). While it performs better than peers in terms of infrastructure, it will need to address gaps in terms of access to financing, which remains one of the major challenges hampering the growth of Internet businesses in Algeria. The venture capital industry is virtually nonexistent, which limits the prospects for early-stage Internet startups. The relatively high number of procedures and the time required to start a new business, and the lack of clarity around some of these procedures, also constrain entrepreneurship in Algeria.[50] Algeria would also benefit from a greater focus on cultivating human capital and high-tech skills.

Nevertheless, Algeria has enormous potential for ICT development. It has an increasingly dynamic young population, reasonable Internet readiness given the existing infrastructure, and wealth from significant oil and gas reserves. To overcome these challenges and increase the Internet's contribution to GDP, Algeria needs to resolve its 3G/4G license awards. Finally, the government will need to ensure that the prerequisites are in place to deliver on e-Algeria 2013.

50 *Ease of doing business index 2012*, World Bank, 2011.

Exhibit 46
Algeria's i5F vs. cluster and sample countries



SOURCE: McKinsey Global Institute analysis

Angola

With four decades of civil war behind it and a current GDP of $122 billion, Angola can now focus on economic growth and improving its human development indicators. In recent years, consumer access to telecom services has increased significantly. The advent of mobile was a leap forward in telecommunications: while fixed-line penetration remains at 2 percent, mobile penetration had grown from less than 1 percent in 2000 to almost 97 percent in urban areas and around 49 percent nationally in 2012. Mobile handset ownership is almost universal across all ages between 16 and 55, at more than 95 percent.

Internet penetration currently stands at 15 percent nationwide, with significantly higher usage in urban areas (49 percent) and among the 16-24 age group (48 percent). The PC is the dominant access platform in urban Angola, even though 25 percent of urban users have Internet-enabled phones and 7 percent have smartphones (Exhibit 47).

Compared with Internet users in the other sample countries, urban Angolans turn to the Web more frequently for email and search—and they are almost twice as likely to read the news online. Social networking is also a popular communication tool. But Angola lags behind in commercial applications, particularly online shopping and travel bookings. While this might, to some extent, reflect payment and logistics challenges, it also points out an emerging opportunity that may increase over time as incomes rise among today's young Internet users.

Angola's iGDP is $592 million, which equates to 0.5 percent of GDP. However, when adjusting for oil revenue, Angola's iGDP increases to 1.2 percent—in line with the average for the sampled countries. Private consumption drives 79 percent of iGDP, with two-thirds coming from computer sales (along with 26 percent from broadband revenue, 6 percent from smartphones, 2 percent from e-commerce, and 1 percent from mobile Internet).

Exhibit 47

Angola's Internet penetration in 2012

$592 million
Angola's iGDP, which is 0.5% of total GDP

3.0 million
Internet users

49%
mobile penetration

645,000
Facebook users

9%
have access to a PC

For every 100 urban Angolans …

49
are online monthly

35
have Internet-capable mobile phones

7
have smartphones

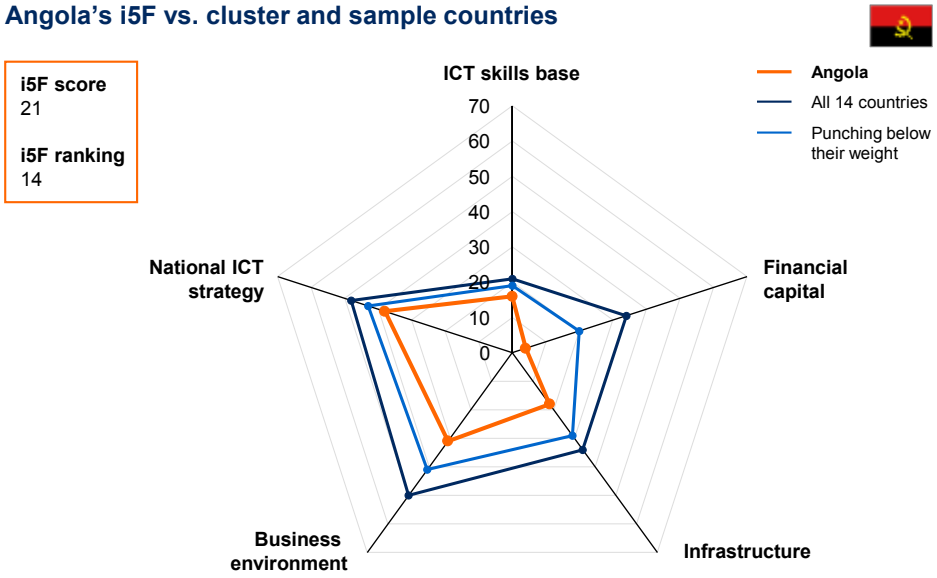
SOURCE: World Economic Forum; McKinsey Africa Consumer Insights Center survey, 2012; Internet World Stats; McKinsey Global Institute analysis

Public expenditure contributes 13 percent of Angola's iGDP (which translates to $4 per capita), while private-sector investment in Internet-related technologies accounts for 9 percent of iGDP (or $2.80 per capita). This places Angola among the top five in our sample for per capita spending by the public and private sectors. This raises two questions: Could Angola invest even more to bring it in line with leading emerging markets and developed markets? And can it improve the effectiveness of its spending in driving iGDP?

Several projects are under way to digitise education, health, and public services. The Angolan government has invested in creating a network of high-tech multimedia libraries in all provincial capitals, with a focus on serving students; the first six sites have already been inaugurated, and construction is under way on another six. Two "digital hospitals" were launched in Luanda in 2012, connecting a wider network of several hospitals and enabling them to perform remote surgeries, host conferences, and increase contact between doctors. The objective is to extend the programme to other provinces, making all services more automated. And more broadly, Angola's e-government initiative aims to deliver services more efficiently while cutting costs, streamlining bureaucracy, and reducing opportunities for corruption. A "one-stop" portal connects citizens with websites that offer information about government services.

To leverage the full potential of the Internet, Angola will need to strengthen its Internet foundations, as it currently scores 21 percent on the i5F index (Exhibit 48). One of its priorities should be to continue to invest in infrastructure to ensure reliable electricity supply and increased coverage, particularly in rural areas. It will also need to commit to building human capital by broadening access to education and attracting tech talent that can support the growth of the ICT sector. Improving the general ease of doing business will improve the odds for Internet startups, but another important element for policy makers is addressing startups' access to capital, whether through government funding programmes or regulatory steps to deepen and diversify credit channels.

Exhibit 48
Angola's i5F vs. cluster and sample countries



SOURCE: McKinsey Global Institute analysis

Ethiopia

Ethiopia is a relatively small economy in which agriculture plays a large role. Economic growth averaged 10.5 percent annually between 2004 and 2011, which helped to bring poverty down from 39 percent to 30 percent.[51] In 2012, Ethiopia's GDP was $38 billion.

PC penetration currently stands at only 2 percent of the population, and only three out of every 1,000 households have access to a high-speed Internet connection (Exhibit 49). While mobile penetration across the nation as a whole is currently 24 percent, most urban residents have mobile phones.

General ICT usage is dampened partly by a lack of competition and partly by restrictions on advanced Internet applications. Cybercafés are still the most commonly used access point, though mobile access has been growing. Social networking and email are the most common reasons for urban Ethiopians to go online (Exhibit 50).

Ethiopia's iGDP is $215 million, or 0.6 percent of GDP. It is almost entirely made up of private consumption (98 percent), with public expenditure and private investment each accounting for 1 percent. However, given recent developments, Ethiopia will be in a good position to catch up with the rest of the continent. As a result of policy initiatives such as investment in 10,000 kilometres of fibre backbone, establishment of an e-government portal and m-government services, and plans to integrate ICT into education, Ethiopia has improved significantly on the UN E-readiness index since 2003. Private consumption is dominated by hardware sales (62 percent PC sales, and 24 percent smartphone sales). Online retail is negligible, due in part to low access to banking services and debit or credit cards.

51 *Ethiopia economic update: Overcoming inflation, raising competitiveness*, World Bank, November 2012.

Exhibit 49
Ethiopia's Internet penetration in 2012

$215 million
Ethiopia's iGDP, which is 0.6% of total GDP

960,000
Internet users

24%
mobile penetration

2%
have access to a PC

For every 100 urban Ethiopians …

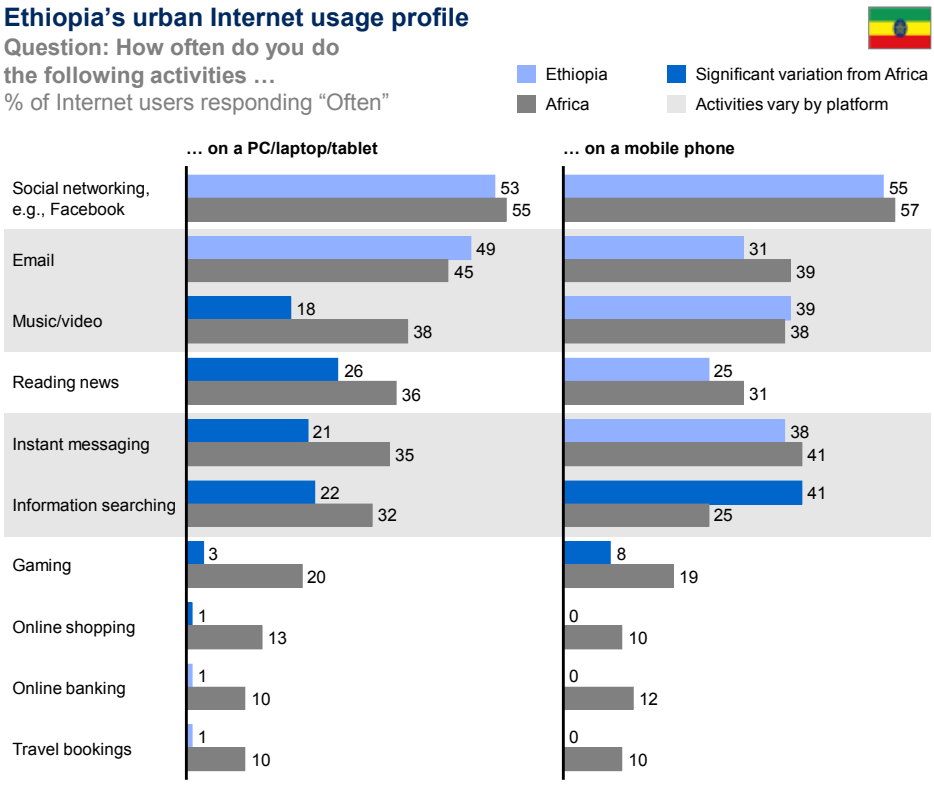
47
use the Internet monthly

55
have Internet-capable mobile phones

10
have smartphones

SOURCE: World Economic Forum; McKinsey Africa Consumer Insights Center survey, 2012; Internet World Stats; McKinsey Global Institute analysis

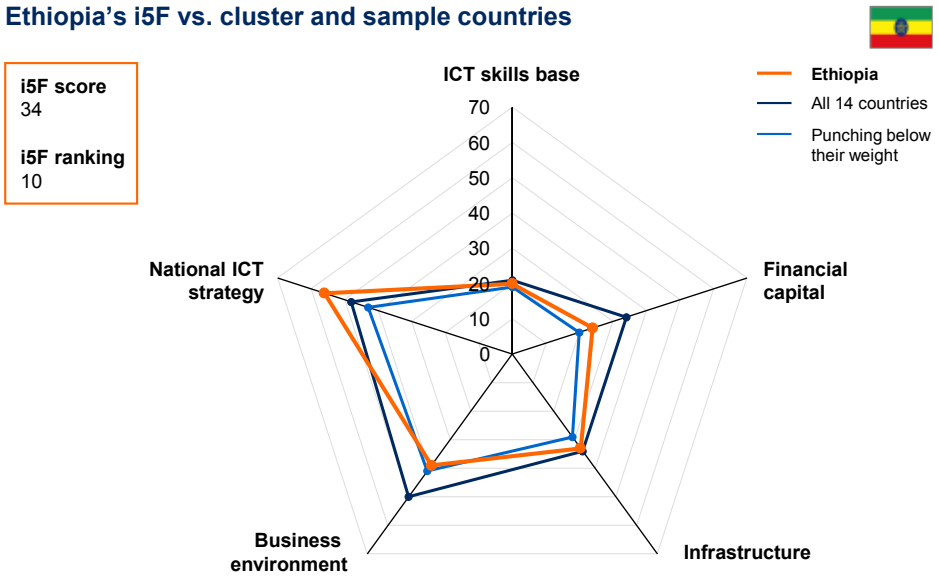
Exhibit 50
Ethiopia's urban Internet usage profile
Question: How often do you do the following activities …
% of Internet users responding "Often"



SOURCE: McKinsey Africa Consumer Insights Center survey, 2012; McKinsey Global Institute analysis

Ethiopia's i5F score is 34 percent, bolstered by government prioritisation, which is detailed in the national ICT policy. The government's use of the Internet is still very limited, but Ethiopia's e-government strategy aims to change that by rolling out information portals and moving services online. However, Ethiopia will need to strengthen the other foundations of Internet readiness (Exhibit 51).

Exhibit 51
Ethiopia's i5F vs. cluster and sample countries



SOURCE: McKinsey Global Institute analysis

In terms of workforce development, enrolment in tertiary education is low, and there is also a general shortage of scientists and engineers. These are daunting challenges, but change is coming. Ethiopia is making significant investments in education. Its primary school enrolment rate now stands at 68.5 percent.[52] Similarly, the rates for gross enrolment in general secondary education and functional literacy have improved. Having achieved high levels of enrolment, the government is undertaking policy initiatives to improve the quality of education and to ensure that the skills being taught match the evolving requirements of the economy.

Further iGDP growth could be stimulated by focusing on improvements to telecommunications and power infrastructure. The ICT sector could benefit from increased competition, which could attract foreign expertise and investment to jumpstart the ICT sector. In addition, policy makers will need to introduce reforms to address Ethiopia's environment for startups, which is ranked low by the World Bank.[53]

52 *African economic outlook 2012*, African Development Bank, OECD Development Centre, UN Economic Commission for Africa, and UN Development Programme, 2012.

53 *Ease of doing business index 2012*, World Bank, 2011.

Nigeria

Africa's second-largest economy, with a GDP of $275 billion in 2012, and its top oil producer, Nigeria has exceeded 6.5 percent annual growth over the past decade, thanks mainly to exports of natural resources. This has enabled the country to commit more resources to social development, especially education, although Nigeria still faces formidable challenges with regard to poverty and literacy. An unreliable electricity supply has led most businesses to rely on alternative forms of power, and only four out of 100 people in rural areas have access to the national electric grid. However, as more investors are becoming aware of Nigeria's potential, things appear to be changing with a vibrant private sector expected to drive significant improvements in the coming years.

Of the estimated 2.2 million fixed lines in Nigeria, only 480,000 were active at the end of 2012, and PC-based Internet access is still low. But the advent of mobile has given new momentum to the telecom sector. Nigeria now has eight mobile operators. Among urban residents, it is estimated that 99 percent have access to mobile phones and 50 percent go online (Exhibit 52). Social networking is the most popular online activity, followed by reading news and watching music or videos. Online job search is also a growing trend, led by Jobberman, a fast-growing platform that connects job seekers and employers. In general, urban Nigerians are more than twice as likely as the average African Internet user to conduct transactions online (Exhibit 53).

Nigeria's iGDP is $2 billion, which is 0.8 percent of its annual GDP—a share that is below the African average of 1.1 percent and the 1.9 percent average for all aspiring countries. However, when adjusting for oil revenue, its iGDP increases to 1.53 percent, which comes in above the average for the sample.

Private consumption accounts for three-quarters of iGDP ($1.53 billion) and breaks down into 70 percent for computer and smartphone sales, 28 percent for broadband access, and 2 percent for e-commerce activity. But Nigeria's e-commerce sector is already producing a wave of fast-growing new companies such as Jumia, Konga, and WebMall Nigeria. Some have found innovative ways to deal with the country's limited logistics and online payments infrastructure. Jumia, for example, has established a delivery fleet in Lagos and offers cash-on-delivery options. Mobile money operators such as Paga are offering support services by establishing centres where customers can collect orders and pay in cash or by e-wallet. However, in general, mobile money has been slow to take off.

Private-sector investment in Internet-related technologies accounts for 5.8 percent of iGDP, below the 8 percent average across the sample countries. This translates to $0.72 per capita.

Public expenditure on Internet technologies drives 25 percent of iGDP, far outstripping the African average of 7 percent. This translates to $3.10 per capita, which is sixth among the sample countries, but this should increase as the Nigerian government implements its recently approved national broadband strategy, which prioritises infrastructure development and aims to extend Internet access to 80 percent of the population by 2018. In addition, the government is beginning to move services and information online, which will not only increase Internet usage but will also increase transparency and efficiency. The implementation of the Government Integrated Financial Management Information System (GIFMIS) has already improved working capital efficiency and oversight.

Exhibit 52
Nigeria's Internet penetration in 2012

$2 billion
Nigeria's iGDP, which is 0.8% of total GDP

48.4 million
Internet users

6.6 million
Facebook users

68%
mobile penetration

10%
have access to a PC

For every 100 urban Nigerians …

50
access the Internet monthly

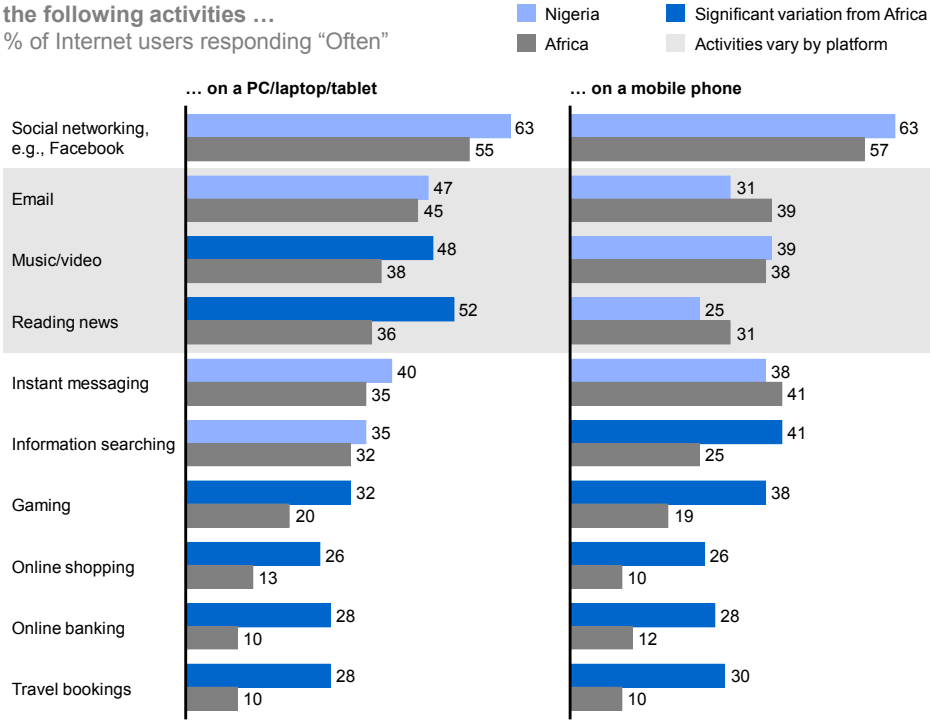
58
have Internet-capable mobile phones

21
have smartphones

SOURCE: World Economic Forum; McKinsey Africa Consumer Insights Center survey, 2012; Internet World Stats; McKinsey Global Institute analysis

Exhibit 53
Nigeria's urban Internet usage profile

Question: How often do you do the following activities …
% of Internet users responding "Often"



SOURCE: McKinsey Africa Consumer Insights Center survey, 2012; McKinsey Global Institute analysis

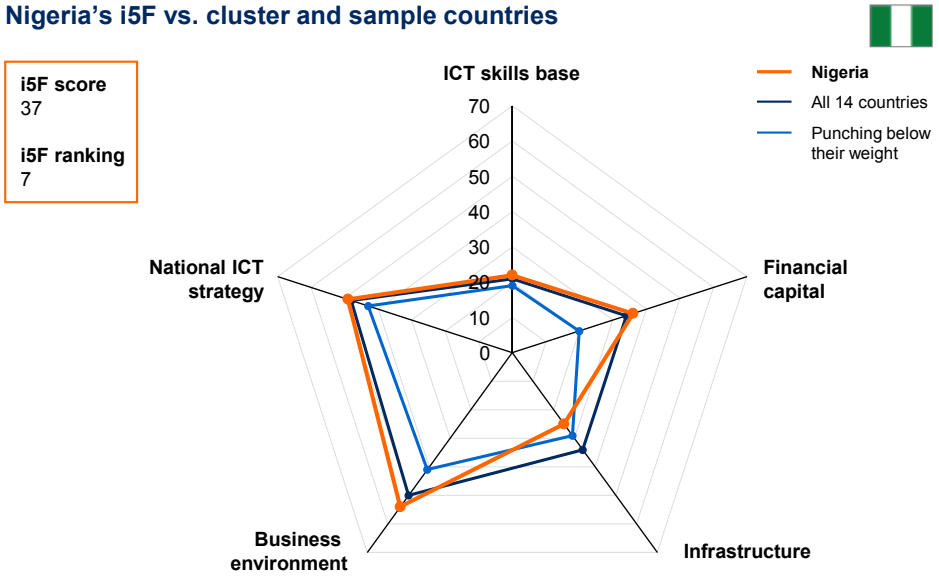
Because Nigeria relies on imported technology and services, its Internet-related trade deficit currently reduces total iGDP by 6.4 percent. This could change, however, as Nigeria expands into hardware manufacturing and software development through government initiatives to drive local content. Veda laptops (including a low-cost model for students) are manufactured locally, and Mi-Fone has announced plans for a new plant in Nigeria that will make affordable mobile phones for the African market.

The government recognises the benefit of ICT in education and is already working to train teachers with ICT knowledge and skills. But the deployment of ICT in primary and secondary education is hampered by two main factors. First, most of the schools that will be required to pay for their own ICT needs cannot afford the connectivity costs (or even the primary or backup power required to run the equipment). Second, there are challenges around securing the necessary equipment. Usage therefore remains low and is limited to projects that are still largely experimental or in a pilot phase. “English Teacher”, for example, is a joint project between UNESCO and Nokia (supported by the British Council and the National Teachers Institute of Nigeria) that aims to use mobile phone technology to improve English literacy skills among primary school teachers and students. There are also sites such as Jamb Tutor that help students prepare for exams.

The use of technology to improve health delivery is still limited, although there are some interesting pilots. The Nigerian Federal Capital Territory Millennium Development Goals Unit has partnered with Intel to launch Mailafiya, a programme that collects and shares patient data to identify disease trends and mobilise resources as needed. The target areas included more than 800 villages with little or no access to primary health care. Mailafiya relies on a rugged, easy-to-use, reliable Intel-powered netbook PC designed specifically for rural use. In addition, Nigeria’s Health Ministry has adopted a public-private partnership model with MTN as the main partner to seek ways to develop and roll out m-health.

Nigeria’s favourable climate for entrepreneurship creates a good platform for the future growth of its ICT industry, and a number of technology businesses are emerging. But Nigeria’s i5F score is 37 percent, indicating that important Internet foundations are not in place, notably the necessary power and telecommunications infrastructure and access to capital (Exhibit 54). E-government services are underutilised, but service could improve if the government continues to support its planned telecommunications infrastructure rollout. In addition, Nigeria has to address human capital needs, including its low tertiary education enrolment rates, a lack of collaboration between university researchers and industry, a shortage of scientists and engineers, and a talent diaspora.

Exhibit 54
Nigeria's i5F vs. cluster and sample countries



SOURCE: McKinsey Global Institute analysis

□ □ □

Each of our sample countries has had varying degrees of success in advancing the Internet, and all face continuing challenges that they will need to address to unlock its transformative potential. Common across all countries is the need to improve the network infrastructure and to increase the number of skilled IT professionals and engineers needed to support a robust Internet sector. This is easier said than done, of course, and will require coordinated efforts from governments and the private sector alike.

4. Unlocking the Internet's full potential in Africa

In the previous chapter, we surveyed some of the strengths and gaps that exist in the continent's current foundations for Internet readiness. Here we take a closer look at the implications of these findings for policy makers. In addition, we will examine the role businesses can play in developing a robust Internet economy—as well as the economic opportunities and challenges they will face. The public and private sectors will have to work together to realise the full economic and societal benefits of the Internet.

GOVERNMENT INITIATIVES

All 14 countries in our sample have singled out Internet development as a priority, but not all have been systematic in their approaches or successful in translating their goals into GDP impact. The i5F index for Internet foundations described in Chapter 3 reveals that most countries scored above 40 percent on the dimension of national ICT strategy. The leaders in this measurement were Senegal (68 percent) and Kenya (59 percent), which also lead in terms of iGDP.

In our view, there are five key elements that determine a government's ability to successfully support the development of the Internet. These include a coordinated national vision, driven by a strong champion and supported by a strong focus on implementation; collaboration with the private sector; a strategy to generate demand; support for expanding access; and a commitment to building ICT capabilities in the workforce.

A coordinated national vision and national champion

To be effective, a national strategy needs to include the broader social and economic goals of developing the Internet and the implications for all facets of government and business. It should also include a clear road map for building out telecommunications infrastructure (and power infrastructure where it is lacking) in a cost-effective way. A coordinated e-government strategy can drive demand as well as demonstrating commitment, and objectives for developing the private sector and local industry should also be included.

Creating and sustaining momentum, however, often requires a national champion with the political will to drive forward a vision for the Internet's role in the country's future. In Rwanda, for example, the president was the main voice behind the government's joint venture with South Korea's KT Corporation to build out a 4G network that aims to reach 95 percent of the population in the next three years.

To carry out the national strategy in practical terms, it may be effective to establish a function akin to that of a chief information officer (CIO). This role would call for forward thinking, ICT expertise, and the ability to work with ministries and the private sector to put the necessary enablers in place. A strong CIO would also be able to set standards, coordinate government spending, and minimise

the associated bureaucracy. In Kenya, the ICT board has been the driving force behind the implementation of its national ICT strategy (see Box 4, "Kenya's strategy for ICT success").

Box 4. Kenya's strategy for ICT success

Kenya has adopted a holistic approach to increasing Internet access and use, providing valuable lessons both on the importance of government prioritisation of ICT and on the role of the private sector. Its success prompted Google Chairman Eric Schmidt to note that "Nairobi has emerged as a serious tech hub and may become the African leader".

Kenya's policy initiatives have included the appointment of an ICT board that was empowered to shape a long-term national strategy, facilitate investment, and encourage innovation in both the private and public sectors. The government has adopted progressive regulation to drive demand and affordability (although it recently reversed a 2009 decision to exempt handsets from VAT). It has also invested in the fibre backbone, e-government services, and ICT education (with solar-powered laptops provided to students in partnership with Microsoft).

This favorable policy environment has prompted considerable private-sector investment and innovation. Safaricom, Kenya's largest mobile operator, has played a key role in investing in affordable access and has established a separate data division. Western multinationals have taken note, too: IBM opened its first African research facility in Kenya, and Microsoft has entered a partnership to deliver high-speed wireless broadband using solar stations and TV spectrum white spaces. Plans are afoot to manufacture PCs locally, while the iHub incubator has created more than 100 ICT businesses. In addition, a public-private partnership is being established to develop the new Konza Techno City as a hub for high-tech companies.

Collaboration with the private sector

The private sector has a critical role to play in developing the Internet economy, in terms of both infrastructure investment and driving innovation. Governments can facilitate this by creating a business environment that is conducive to investment. In general, business environment was one of the stronger Internet foundations for the countries in our sample, which produced i5F dimension scores ranging from 31 to 67 percent. However, countries such as Angola, Algeria, Côte d'Ivoire, and Mozambique could benefit from further strengthening this foundation.

Governments could actively try to attract multinational corporations through investment-friendly policies. Developing ICT parks can also help by encouraging tech companies to form a critical mass. The presence of multinationals can facilitate knowledge transfer, local skills development, and faster innovation. Governments can also partner with the private sector on specific projects. South Africa's Department of Trade and Industry, for example, partnered with the Business Trust to deepen the talent pool, design incentives, and attract the investment necessary to launch a successful business process outsourcing industry.

Governments can create a vibrant ecosystem for startups by establishing technology incubators and supporting investment funds. Across the sample countries' i5F scores, there was significant variation on the dimension of access to financial capital, which ranged from 4 to 67 percent. Countries that could benefit from particular focus on this issue include Angola, Algeria, Mozambique, and Ethiopia.

Generating demand

Africans are eager to go online for social networking, email, and music. But relying on natural momentum alone is unlikely to generate sufficient demand to drive the Internet economy. Governments have a part to play in generating demand, especially among populations that are unaware of the Internet's benefits. Digital literacy programmes can increase awareness of the Internet and its utility. Incentives can also be designed to encourage businesses to digitise their operations and services and for local content. In addition, digitising government operations as well as providing online services to businesses and consumers for processes such as tax filing will increase Internet-related public expenditure. Nigeria's new government services portal, for example, is designed to increase the public use of ICT.

Increasing access

There are two elements to increasing access: network infrastructure and widespread access to affordable devices. On the dimension of infrastructure, there was a wide range of i5F scores for our sample countries (from 18 to 50 percent), but all countries have the potential to improve their infrastructure. While there has been a significant increase in international bandwidth since 2009, investments will be required to increase download speeds and coverage in rural areas. In addition, the overall ecosystem could be made more robust though increasing the number of secure Internet servers.

Expanding Internet access will necessarily require large investments by telecom operators (see below), and regulators can play a significant role in ensuring that the right conditions are in place to encourage this investment and to make it cost-effective. Regulators have five levers at their disposal: ensuring a viable industry structure that balances competitive intensity with favourable conditions for investment; optimising spectrum allocation and making low-frequency spectrum available; ensuring spectrum license fees are cost-efficient; supporting the sharing of infrastructure and spectrum; and instituting targets and incentives for coverage. The key will be striking the right balance between setting standards and allowing the market the freedom to develop and innovate. The effective allocation of low-frequency spectrum is one of the key issues facing policy makers today, and it will shape the future of Internet roll-out and adoption.

Building ICT capabilities

All 14 countries in our sample had relatively low scores on the dimension of ICT-related human capital. South Africa scored the highest, at 30 percent, and Morocco was second at 24 percent, but the rest of the sample scored between 16 and 22 percent. Expanding access to education and improving retention rates and learning outcomes is a longstanding goal for governments across the continent. Chapter 2 described how digital tools can accelerate progress, while simultaneously building a new comfort level with technology in the next generation of Africans. Over the long term, a focus on technology skills will

have to be integrated into every level of the education system. In the shorter term, governments may need to work with the private sector to expand training programmes to meet more immediate workforce needs as they seek to build local industries. This is a far-ranging issue, and governments will therefore need to take a systematic approach, perhaps in partnership with NGOs and the private sector. See Box 5, “Strengthening foundations”.

Box 5. Strengthening foundations

To build a flourishing Internet economy, Africa needs to cultivate technical and entrepreneurial skills—and some organisations are already tackling these challenges.

The Internet is creating new jobs in fields such as data and records management, customer service, and IT support, which is welcome news in light of Africa’s high levels of youth unemployment. But the key will be making sure that young workers are equipped with the right technical and soft skills to succeed in a digital workplace. The Rockefeller Foundation has launched a seven-year, $100 million Digital Jobs Africa initiative in Egypt, Ghana, Kenya, Morocco, Nigeria, and South Africa. It provides targeted training in skills and technology to disadvantaged young people with high potential while working with employers and partners to stimulate job creation and encourage more inclusive hiring. One example of these efforts is the Impact Sourcing Academy, founded in partnership with the Maharishi Institute and Aegis Outsourcing SA. In its first year of operation, the academy provided 550 young South Africans with work-ready skills and matched them with guaranteed jobs in the fast-growing BPO sector after they completed the programme; it hopes to double the number of trainees in the year ahead. The goal is to create better prospects for the next generation, while improving productivity in sectors of the economy that can benefit from a well-trained digital workforce.

The Exposure Robotics Academy introduces Nigerian students to the world of software development and robotics through an intensive summer programme led by instructors recruited from MIT and Columbia University. Exposure Robotics seeks sponsorships from large corporations to cover tuition costs for low- to middle-income students, and it has begun to expand its footprint to include other West African countries, beginning with Ghana.

A non-profit venture of the global software firm Meltwater, Ghana’s Meltwater Entrepreneurial School of Technology (MEST) runs a two-year graduate programme that emphasises hands-on learning and the practical skills needed to run a software company. MEST also offers an incubator that mentors aspiring entrepreneurs and an investment fund that offers early-stage capital to budding software startups.

While these are promising initiatives, however, the full development of Africa’s Internet economy will depend on addressing education and human capital development on a larger scale and in a more systematic way.

PRIVATE-SECTOR OPPORTUNITIES

The growth of the Internet in Africa opens the door for established companies to expand their reach and add new business lines. But the competitive dynamics are intensifying. The Internet gives startups the ability to scale up rapidly, and some may be sources of low-cost innovation that can disrupt entire industries.

In addition, multinationals increasingly realise that Africa's growing Internet penetration presents an opportunity to reach untapped markets. If local companies do not innovate quickly, they could lose out to multinationals that import solutions. Conversely, for foreign companies, the challenge will be realising that Africa is not a monolithic market and tailoring their offerings to fit local needs; they will be competing with businesses that understand the local context and how to operate in it. It will be important to spot gaps in the market and move decisively, as first movers are likely to gain a significant advantage.

Telecom operators

Data is the future, and telecom operators will need to prepare for a pronounced migration from voice to data. The growth of mobile data will help to offset the decline in voice revenue, and the operators that lead in this area are likely to be the winners in the long run. But they will need to focus on creating access and generating demand (via increased adoption and usage).

In terms of access, operators can drive a rapid scale-up of mobile data services by continuing to roll out base stations (including 4G networks) and fibre backhaul to meet users' need for a fast and reliable connection. As they build out more fibre backhaul, operators will be able to provide last-mile fibre in selected areas where the business case makes sense (for example, corporate parks and affluent residential areas), thereby completely changing the user experience and enabling selected pockets to use higher-bandwidth applications. This implies that while mobile will be the dominant form of access on the continent, fixed-line access could also play an important role; however, it is likely to be provided by today's mobile operators.

In terms of generating demand, operators can focus on improving the network experience, reducing the monthly access cost and increasing pricing transparency, educating customers on using the service, and demonstrating the utility of Internet usage to new populations. They can also optimise network allocation between voice and data by using data compression and buffering technologies.

Operators will also need to ensure that their services are affordable and easy to understand, with straightforward pricing plans that allow customers to budget effectively. These plans could be based on minutes of usage or restricted to a certain number of applications. Operators could even reduce speeds when a cap is reached to prevent bill shocks. Entry-level products will be needed to drive adoption at the low end of the market. Lower-speed bundles and packages could be made available with the option for customers to pay a premium for upgraded speeds. The introduction of lower-cost devices and the establishment of a secondhand smartphone market are other ways to drive adoption.

Operators can educate customers on the use of their service through below-the-line campaigns (which involve promotions and trials that target messages directly to consumers) and making setup hassle-free (perhaps by pre-installing Internet services on devices). They can also demonstrate the Internet's utility through "freemium" offers, such as low-spec Twitter or USSD-based Facebook (which allows users to access the social networking platform and use some features on their mobile phones); by offering value-added services such as local language content; or by running interactive campaigns.

Beyond the consumer market, there will be large opportunities to leverage the Internet to deliver ICT services to business customers and government. Current adoption by both companies and government remains relatively low across the sample countries, and to change this, there will need to be affordable, robust offerings.

Other companies

There is enormous room for innovation by African companies across the value chain, from product development to talent management. To capture the opportunities, businesses will need to have a digital strategy that is focused on using new technology to enhance productivity. As discussed in Chapter 2, the widespread adoption of cloud computing, for instance, will give thousands of companies access to basic software and enterprise systems while minimizing the capital investment required.

In terms of product development, there will be opportunities to enhance existing products and services through online channels—and to develop entirely new digital business lines. Sales and marketing could be one of the key areas to benefit through targeted digital marketing, optimised pricing, and digital distribution of services and content.

Companies should consider placing a few big bets on innovative services, whether in mobile payments, e government, online learning, or digital health systems, either on their own or in partnership with government or with companies from other sectors. However, they will need to move fast in order to claim the space, as there is an advantage to playing the integrator role. Tech companies can also help to drive the adoption of the Internet and IT services among corporates and SMEs. SME-in-a box solutions, which bundle basic infrastructure and software services (such as e-mail with voice and data), could be popular.

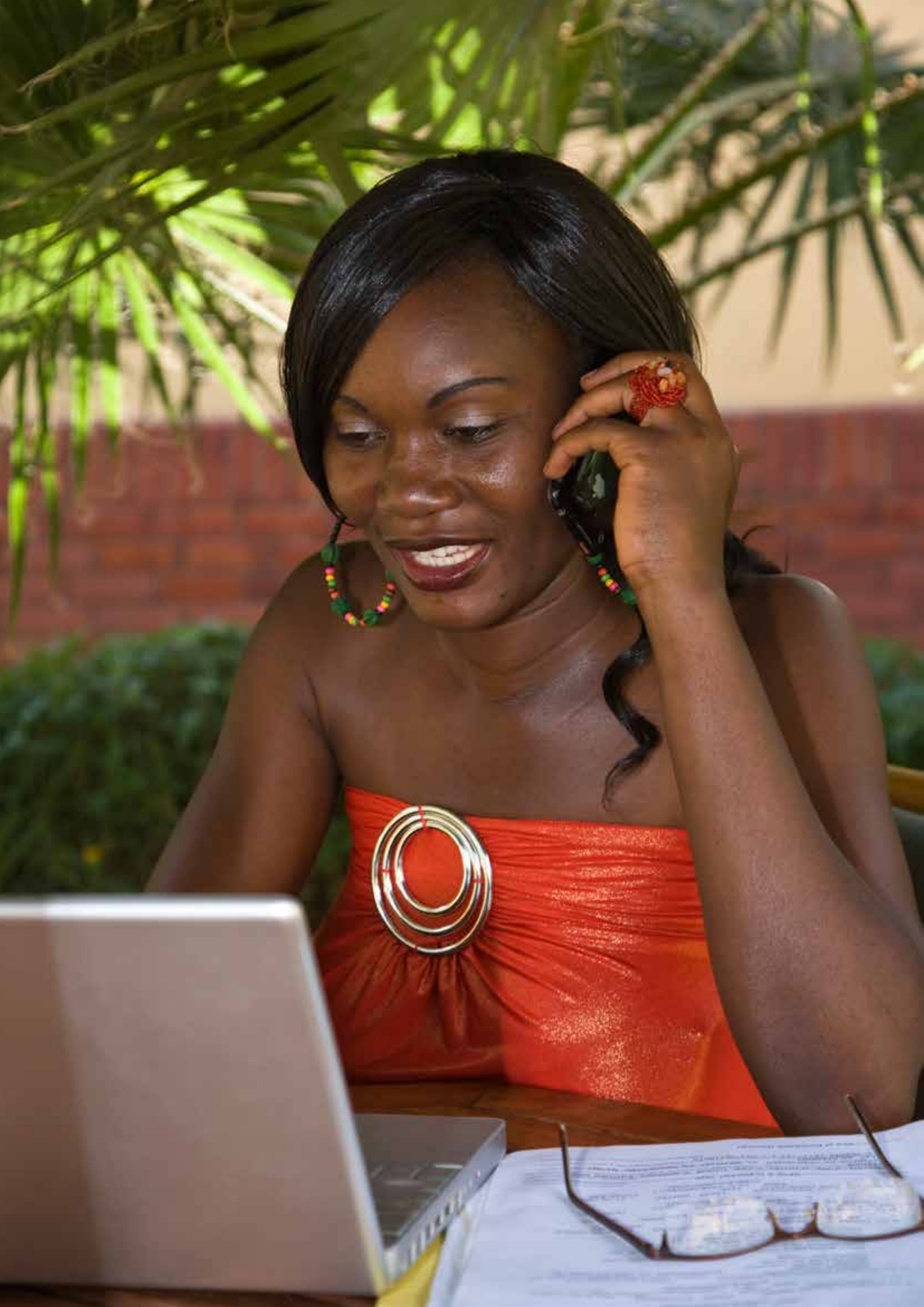
Companies from different sectors may need to collaborate to deliver new products and services: banks and telecom operators have partnered to provide mobile financial services, for instance, while e-commerce depends on cooperation from multiple players to set standards, create payment platforms, and develop logistics.

Entrepreneurs are an important force in the Internet ecosystem, and this is a moment when new digital ventures can carve out market share in any number of sectors across the economy. But while the Internet dramatically reduces the time and cost of launching a new enterprise, the key to success is building a compelling value proposition and a well-crafted market entry strategy. To navigate these challenges and access funding, entrepreneurs can turn to the networks and support structures that are emerging across the continent, including

incubator hubs and angel networks. Corporations and investors can help to build momentum by supporting local hubs, establishing venture capital funds, and setting up innovation awards as Africa builds a thriving tech community.

□ □ □

Africa's ICT sector is rapidly evolving, with positive ripple effects on investment and innovation. The challenge will be to harness and sustain this early momentum. If governments and the private sector work together to build the right foundations, the Internet could contribute up to $300 billion to Africa's GDP by 2025—all while driving economic and social progress that can have a profound effect on the lives of Africans across all socioeconomic groups.



Appendix: Methodology

1. Determining the set of sample countries
2. Calculating the Internet's contribution to GDP in 2012 (iGDP Index)
3. Calculating the Internet's contribution to GDP in 2025 (iGDP Index)
4. The potential transformative impact of the Internet
5. The impact of the Internet on six key sectors
6. The i5F Index

1. DETERMINING THE SET OF SAMPLE COUNTRIES

Countries were selected for inclusion in the sample based on three main criteria:

- Population size: at least 12 million
- Total GDP: at least $12 billion
- GDP per capita: at least $500

Fifteen African countries met these criteria, but Sudan was excluded based on a lack of sufficient data to conduct reliable analysis.

GDP figures are from 2012 and sourced from the Economist Intelligence Unit.

2. CALCULATING THE INTERNET'S CONTRIBUTION TO GDP IN 2012 (IGDP INDEX)

The Internet's contribution to GDP growth is defined as the increase in Internet contribution to GDP divided by overall GDP growth during the same period.

There are three methods for calculating the GDP contribution of a sector:

- The **production method** measures the value companies add by producing goods and services.
- The **revenue method** measures the gross revenue of institutional sectors, including employee pay.
- The **expenditure method** measures the total spending by consumers and government on goods and services.

None of these methods accounts for the Internet's value to the overall economy of a country or society. The production method is the most common method used to calculate a sector's contribution to GDP. However, calculating the Internet's contribution to GDP using the production method would have required unreliable estimates of Internet-related revenue and margins for all companies in all sectors. Thus, we decided to use the expenditure method.

This method looks at four factors: private consumption, public expenditure, private investment, and trade balance. To calculate the Internet's contribution to GDP, we assessed the contribution of Internet-enabled goods and services included in each of these four categories. To the extent possible, we have used the same data sources for each category across all countries to provide comparable figures. The categories were:

- **Private consumption:** This is the total consumption of goods and services by consumers via the Internet or needed to obtain Internet access. It includes personal computers, smartphone sales (prorated), B2C e-commerce, residential broadband subscriptions, and revenue from mobile Internet use. Private consumption from the Internet is driven primarily by online purchases of goods and services.

- **Public expenditure:** These include Internet spending for consumption and investment by the government (software, hardware, services, cloud, and telecom) at pro rata of the Internet.

- **Private investment:** This is private-sector investment in Internet-related technologies (telecom, extranet, intranet, cloud, websites, and so on).

- **Trade balance:** This is exports of goods (including Internet equipment) and services, plus B2C and B2B e-commerce, from which were deducted all associated imports. For South Africa and Morocco, specific estimates of business process outsourcing activity were included because both countries already export significant services in this area.

For each component of the contribution to GDP, we then looked at the following assumptions regarding the underlying portion related to the Internet:

- For electronic equipment (computers and smartphones), we applied a ratio based on the overall time spent on the Internet against the total time using the product.

- For goods and services sold on the Internet, we recognised them at their full e-commerce value because they indicate the importance of the Internet industry as a link in the distribution chain, even though certain Internet transactions might have occurred in the absence of the Internet.

- For Internet mobile and fixed subscriptions, we took 100 percent of individual expenses.

- For ICT goods and services, public expenditure, private investments, and trade balance, we used a bottom-up analysis based on the description of each subcategory (hardware, telecom, software, and services) in the McKinsey TMT (High Tech, Media, Telecom) database. This allowed us to allocate a share of ICT goods and services to the Internet (we estimate that 70 percent of software and services and 40 percent of hardware and telecom is related to the Internet). A separate bottom-up analysis was done for semiconductors used in television, radio, and communications equipment, which found that 25 percent of their value was attributable to the Internet.

3. CALCULATING THE INTERNET'S CONTRIBUTION TO GDP IN 2025 (IGDP INDEX)

To estimate the Internet's potential contribution to GDP in Africa by 2025, expected impact was calculated for each of the four components of GDP contribution: private consumption, public expenditure, private investment, and trade balance.

- **Private consumption:** Categories evaluated included device sales, Internet use, mobile finance revenue from banking, and e-commerce revenue. Device sales were evaluated by projecting both smartphone and PC sales in 2025 given total African population, expected penetration, and device lifespan. This revenue was then scaled to include only that proportion of the device cost that can be attributed to Internet use. To estimate revenue from Internet use, the expected penetration and revenue per user were used. Banking revenue was

calculated based on McKinsey's projections of African banking revenue pools in 2025 and adjusted for the expected proportion of mobile revenue. Finally, e-commerce revenue was calculated based on expected penetration of online shopping, mobile agriculture use, and m-education services.

- **Public expenditure:** To estimate Africa's public expenditure on Internet-related activities in 2025, a comparison was conducted with two of the eight aspiring countries from McKinsey's previous work in this area. The selected countries were Argentina and Taiwan as these were most closely comparable with today's South African economy and population size. South Africa was selected as a reasonable comparator on the assumption that other African countries would catch up to it by 2025. Using the current public expenditure spend per capita in Taiwan and Argentina, and adjusting for inflation to 2025 (expected to be 4 percent in Africa), the total expected spend for Africa in 2025 was calculated.

- **Private investment:** To determine the expected private investment in the Internet in Africa, a regression analysis was conducted of private investment versus private consumption to establish the relationship between the two variables. A strong relationship was found, and so, based on the projected private consumption for Africa in 2025, a corresponding private investment figure could be calculated.

- **Trade balance:** The African trade balance is expected to be most strongly influenced by BPO and device exports in 2025, with no step changes expected in imports. As such, imports are assumed to grow at the expected African GDP of 4 percent, as are exports other than BPO and devices. However, only five countries were identified as candidates for BPO exports: Morocco, South Africa, Ghana, Kenya, and Nigeria. Morocco and South Africa are already established in this market, and our analysis projected that their BPO industries would continue to grow at the global rate of 8 to 12 percent, while the other three countries are expected to enter the BPO market and grow to South Africa's current size by 2025.

4. THE POTENTIAL TRANSFORMATIVE IMPACT OF THE INTERNET

In order to determine the potential impact from productivity gains (as opposed to direct GDP contributions), the approach used in MGI's recent report *Disruptive technologies: Advances that will transform life, business, and the global economy* informed the potential gains from adoption of Internet-related technological breakthroughs across the continent. The breakthroughs evaluated in this report all conformed to the following set of characteristics:

- The technology is rapidly advancing or experiencing breakthroughs.

- The potential scope of impact is broad.

- Significant economic value could be affected.

- Economic impact is potentially disruptive.

However, not all of the identified technologies are directly related to the Internet, and so we selected only the subset of technologies that were applicable. These technologies are:

- **Mobile Internet:** increasingly inexpensive and capable mobile computing devices and Internet connectivity
- **Automation of knowledge work:** intelligent software systems that can perform knowledge work tasks involving unstructured commands and subtle judgments
- **Internet of Things:** networks of low-cost sensors and actuators for data collection, monitoring, decision making, and process optimisation
- **Cloud technology:** use of computer hardware and software resources delivered over a network or the Internet, often as a service

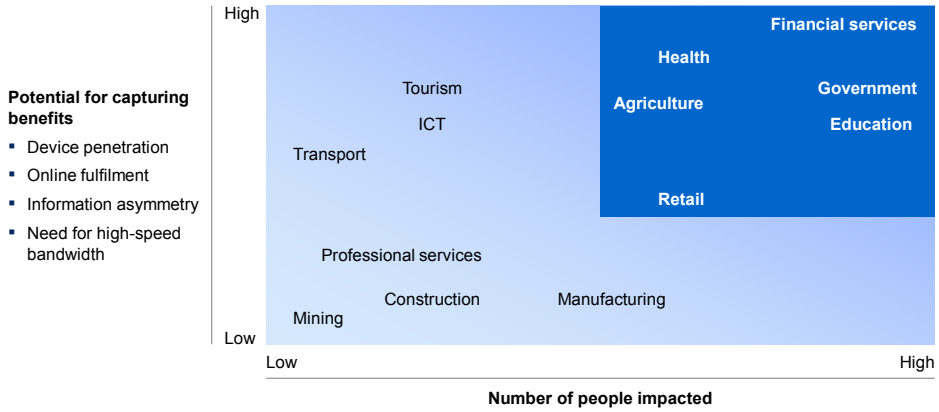
To estimate the total transformative impact of the Internet on Africa through productivity gains, the total estimated gains for the developing world from the *Disruptive technologies* report were scaled based on the contribution of African countries to the overall GDP of developing countries in 2025. The estimate of Africa's GDP contribution was taken from IHS Global Insight's World Market Monitor database on projected GDP for countries around the globe.

5. THE IMPACT OF THE INTERNET ON SIX KEY SECTORS

Six key sectors were selected for specific evaluation to determine the potential impact of the Internet on them, both in terms of direct contribution to GDP through private consumption and as a result of productivity gains due to the adoption of technology. The six sectors were selected based on the ability to capture benefits within the sector and the number of people likely to be affected by greater adoption of Internet technology within the sector. Financial services, health, agriculture, government, education, and retail emerged as the most relevant sectors (Exhibit A1).

Exhibit A1

The Internet can have a transformative impact on six sectors in particular



SOURCE: McKinsey Global Institute analysis

To determine the direct impact of Internet adoption in each of these sectors on the economy, the private-consumption–related activities relevant to each of these sectors were evaluated. Since the government and health sectors would not contribute to private consumption, these were not included in the evaluation. Impacts for the other sectors were estimated as follows:

- **Finance:** McKinsey's detailed banking revenue pools model provides an overall banking revenue pool for Africa. A proportion of this revenue was then identified as likely to come from online banking based on previous McKinsey research on winning in mobile financial services.

- **Retail:** An overall estimate of revenue from online shopping in 2025 was compiled based on the latest McKinsey market research.

- **Agriculture:** The number of farmers in Africa with access to mobile phones was identified based on data available on the Internet (Business Day in South Africa and iHub in Kenya), which was then scaled down according to the expected number of farmers who would subscribe to m-agri services. Finally, through expert interviews, an expected subscription fee was determined.

- **Education:** The total private m-education opportunity was taken from a GSMA-McKinsey study that estimated this for the Middle East and Africa. The Africa proportion was isolated using a GDP split.

In all cases, extensive consultation with internal and external subject matter experts followed the initial analysis in order to validate findings.

To determine the expected impact of productivity gains in these sectors in Africa, the relevant estimated impacts from the *Disruptive technologies* report were again used as a basis for estimating the impact on these sectors in Africa. By scaling the per sector impact across the four selected disruptive technologies based on Africa's contribution to developing economies' GDP in 2025, an estimate of the impact of productivity gains on each of the sectors was produced.

In addition to the six selected sectors, an overall measure of digitisation was included in the estimates of the impact of productivity gains on the economy, primarily to reflect the impact of the adoption of cloud technology.

6. THE I5F INDEX

The i5F Index measures the foundations of an Internet-enabling ecosystem in a country and is based on five components (Exhibit A2):

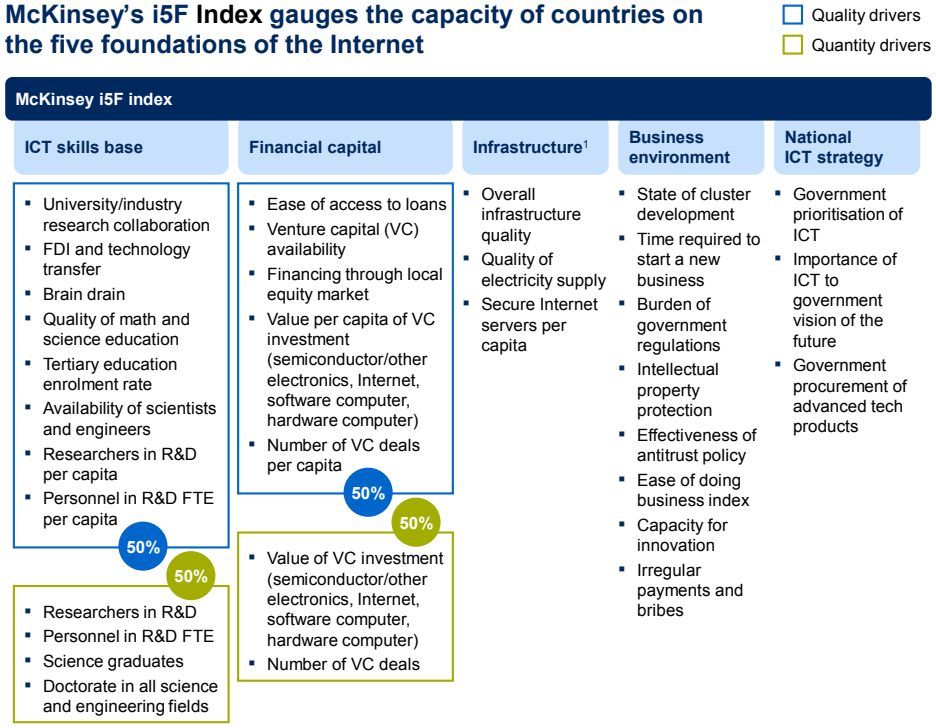
- **ICT skills base:** measures education and research. The score is divided between the quality (50 percent) and the quantity (50 percent) of human capital.

- **Financial capital:** measures availability of financing for Internet and ICT companies. The score is divided between per capita availability (50 percent) and global financing opportunities (50 percent).

- **Infrastructure:** measures the penetration and quality of Internet-enabling infrastructure.
- **Business environment:** measures a country's attractiveness to business due to regulatory and societal effects.
- **National ICT strategy:** measures the emphasis placed on ICT development by government based on prioritisation, importance, and procurement of technological products.

Exhibit A2

McKinsey's i5F Index gauges the capacity of countries on the five foundations of the Internet


Quality drivers
Quantity drivers
McKinsey i5F index
ICT skills base
Financial capital
Infrastructure1
Business environment
National ICT strategy
University/industry research collaboration
FDI and technology transfer
Brain drain
Quality of math and science education
Tertiary education enrolment rate
Availability of scientists and engineers
Researchers in R&D per capita
Personnel in R&D FTE per capita
50%
50%
Researchers in R&D
Personnel in R&D FTE
Science graduates
Doctorate in all science and engineering fields
Ease of access to loans
Venture capital (VC) availability
Financing through local equity market
Value per capita of VC investment (semiconductor/other electronics, Internet, software computer, hardware computer)
Number of VC deals per capita
50%
50%
Value of VC investment (semiconductor/other electronics, Internet, software computer, hardware computer)
Number of VC deals
Overall infrastructure quality
Quality of electricity supply
Secure Internet servers per capita
State of cluster development
Time required to start a new business
Burden of government regulations
Intellectual property protection
Effectiveness of antitrust policy
Ease of doing business index
Capacity for innovation
Irregular payments and bribes
Government prioritisation of ICT
Importance of ICT to government vision of the future
Government procurement of advanced tech products

1 Infrastructure is viewed as being a "threshold" factor where increases above a certain level do not confer additional advantage. All ratings above 60 (our defined threshold) are set to 60.

SOURCE: World Economic Forum; United Nations; United Nations Educational, Scientific and Cultural Organization; Venture Expert; International Institute for Management Development; World Bank; McKinsey analysis

These components were measured across 31 indicators, most of which were informed by the World Economic Forum's Global Competitiveness Report, and the World Bank database. Each component is scored based on the average of its indicators, and the four components determine the index score at equal weight. We maximised the infrastructure component value at 60 percent, because infrastructure is not a differentiating parameter once a country has reached a certain level of infrastructure development and quality.

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